Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Chicago, April 26, 1930 (Issued Every Other Week) Volume XXXIII, No. 9

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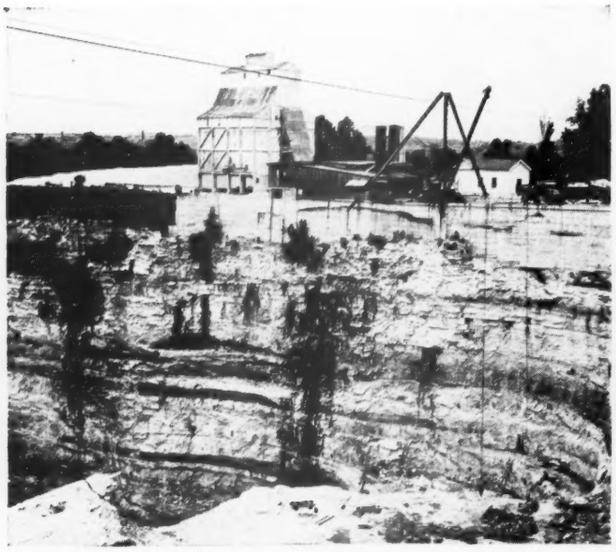
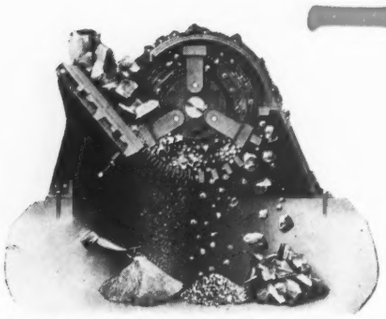


Frank Ruprecht Quarry, St. Louis, fourth in that locality to install a Williams.

St. Louis City Workhouse, fifth in St. Louis to purchase a Williams.

—now EIGHT



Sectional view of Williams Hammer Crusher showing how any size rock can be made by using crusher grates with larger or smaller openings.

Within a few months EIGHT quarries in St. Louis district install Williams crushers to make ¾" to 1¼" stone

On February 1st, we announced in these columns that five St. Louis quarries were making ¾" to 1¼" stone with Williams Hammer Crushers. Since then three more or EIGHT in all have installed this type within a few months. Any time EIGHT wide awake quarry operators in one locality install the same type crusher you can bet that crusher has real merit. If your demand for small sizes, ½" to 1½" is greater than you can supply we'd like to tell you about a Williams for your work. They handle screen rejects, spalls or one man size stone and reduce to macadam, asphalt binder or even agricultural size in one reduction. Seven sizes. Capacities 10 to 75 tons per hour. And the investment required is mighty reasonable.

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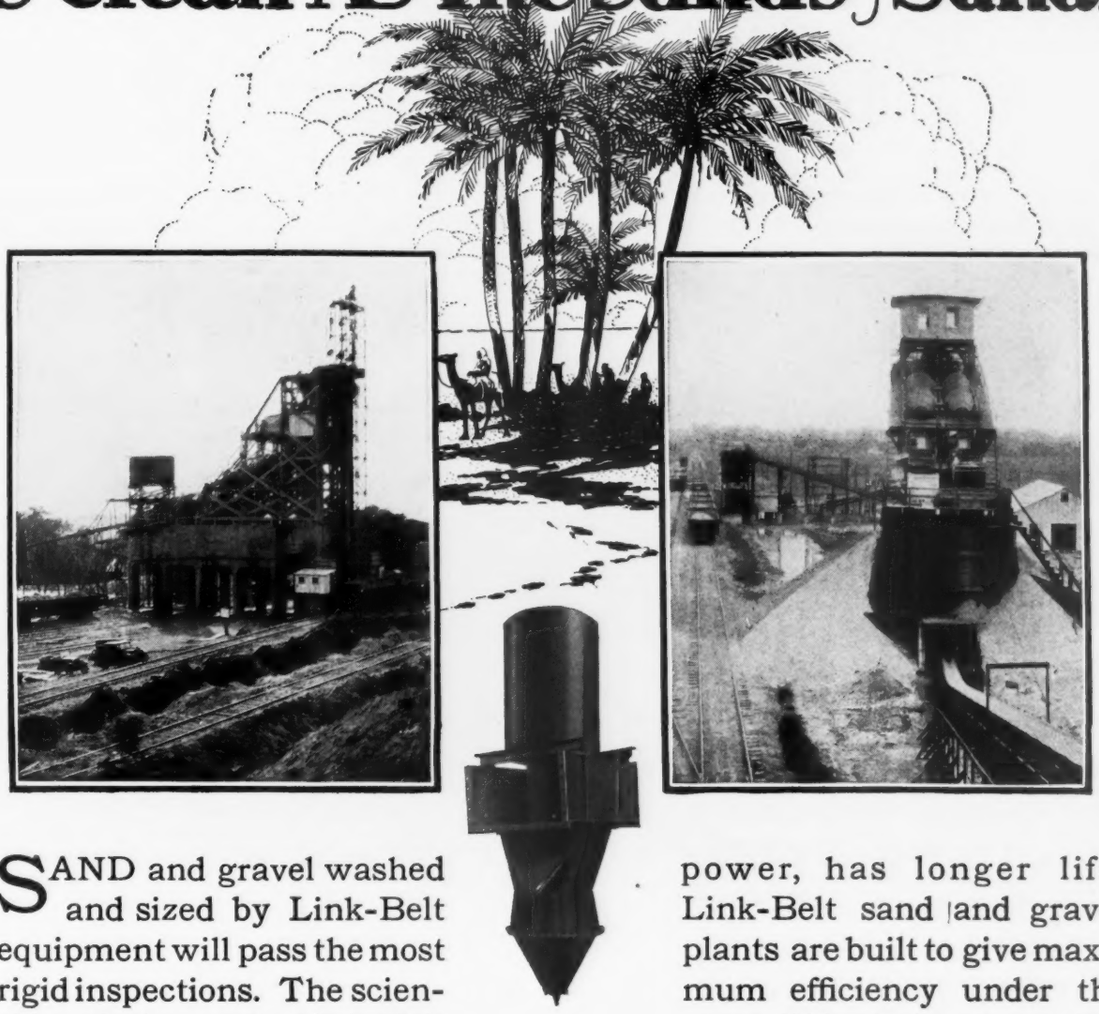

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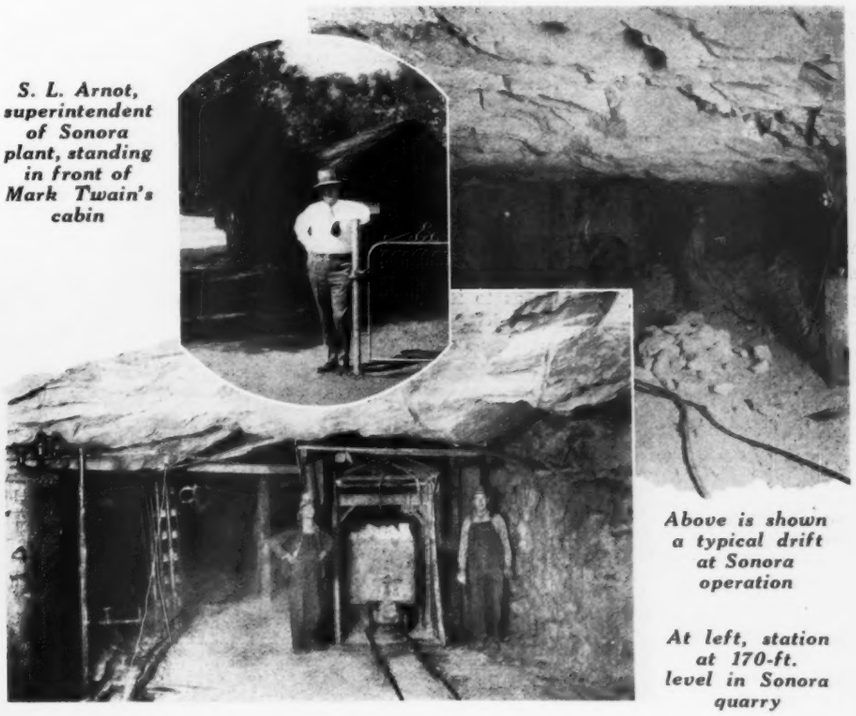
Unusual Lime Operations in Far West

United States Lime Products Corporation Has Plants at Sloan, Nevada, and Sonora, California—Both Hillside Operations But Entirely Different

THE United States Lime Products Corp. is one of the largest and most progressive lime manufacturers on the West Coast. The main offices of the company are at 58 Sutter St, San Francisco. The executive officers are Charles M. Cadman, president and general manager; Goodwin J. Knight, secretary; R. E. Tremoureux, treasurer and consulting engineer.

The company maintains one of the few lime plant control laboratories in the United States, with a competent chemist in charge, and all the products from flux stone on down the line are rigidly analyzed to maintain standards of quality. Daily routine samples are also run on the average kiln feed; car samples for CaO with screen analysis and chemical determination of other lime products. A complete analysis is made of the hydrate, screen analysis, and plasticity determinations are also made on shipments of hydrate.

The United States Lime Products Corp. has a distributing plant at 1840 East 25th street, Los Angeles. All lump lime for that territory is shipped there in bulk. The cars are spotted alongside of a chute leading to a bucket elevator and the cars unloaded by hand shoveling. The bucket elevator discharges to two steel silos each holding 60 tons from which the lump lime can be drawn into drums or sacked in burlap sacks for local distribution. The two silos were originally built by the Western Pipe and Steel Co. for lime kilns and were used at the Sonora plant of the company, and when re-erected at their present location the cooling hoppers and draw gates were left intact, and as now mounted dump trucks can drive under the gates and load direct. However,



S. L. Arnot, superintendent of Sonora plant, standing in front of Mark Twain's cabin

Above is shown a typical drift at Sonora operation

At left, station at 170-ft. level in Sonora quarry

Above, General Superintendent Mocine at entrance to a coyote tunnel

At right, loading stone at Sloan lime plant

A glimpse into the laboratory at Sloan

most of the lump lime is sold either in barrels or in sack containers.

Sloan, Nev., Operation

Las Vegas, Nev., has received so much publicity throughout the United States within the past two years on account of it being the largest and nearest town to the proposed site of the Boulder Canyon dam which the United States Government will shortly start constructing, that most of the readers have an approximate idea as to its geographical location. Twenty miles west of Las Vegas and on the main line of the Union Pacific railroad connecting Salt Lake and Los Angeles is located one of the most interesting lime burning operations in the entire West; interesting not only from a technical standpoint, magnitude of the operation, extreme size of the deposit but also because it is far removed from centers of population where lime is consumed.

Out West nearly everything is described in terms, "millions of acres," "millions of tons"; but the limestone deposits at Sloan owned by the United States Lime Products Corp. run literally into the billions of tons of high calcium and dolomitic limestones, both of which are to be found in the quarry, the calcium limestone being below the dolomites.

The crushing and lime-burning plant is several hundred feet below the main quarry floor and the two are connected by an inclined gravity tram. By referring to the cross-sectional sketch of the quarry face, it will be seen that the lower, or that portion of the mountain below the quarry floor, is an impure dolomite, which is not used; and above this is a ledge 180 ft. thick of high calcium limestone, which extends out from the face of the mountain about 300 ft. in the form of a steep and rugged cliff. This amounts to having a ledge of calcium limestone 180 ft. by 300 ft. extending along the face of the mountain for a mile or more entirely free from overburden or strata of unsuitable material. On top of this ledge and back from the face the 300 ft. referred to, the dolomitic limestone starts and extends to a total height of 800 ft., forming a capping that covers the entire top of the mountain. The company controls 800 acres of this area which are all of economic value.

The dolomitic limestones are practically pure so far as chemical composition is concerned, having the following typical analysis:

SiO_2	0.7
R_2O_3	0.9
$MgCO_3$	41.5
$CaCO_3$	56.9

and the high calcium limestone has the following typical analysis:

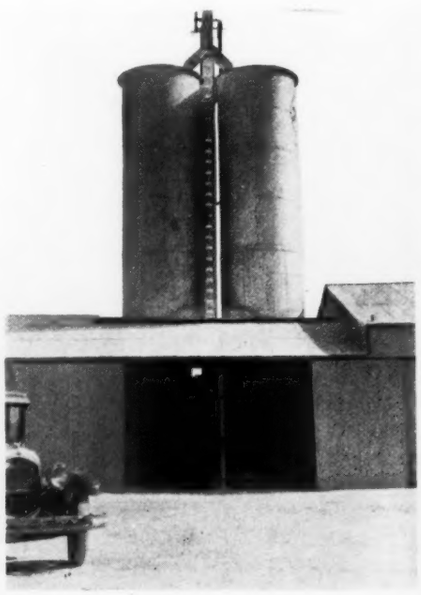
SiO_2	0.8
R_2O_3	0.7
$MgCO_3$	0.7
$CaCO_3$	97.8

Office at Los Angeles distributing yard

A corner of the warehouse in the Sloan, Nev., plant of the U. S. Lime Products Corp.

For many years the Nevada Lime and Rock Corp. operated these deposits totally ignoring the economic value of the dolomitic limestones, but soon after the United States Lime Products Corp. took over the operation of this plant and quarry the company began investigations as to their value, so early in 1928 a small kiln was erected for burning dolomite. The dolomitic lime met with such instantaneous success on the Pacific Coast that a second kiln was installed four months ago, and at the time of inspection, which was during July, a third kiln had been on production for one week.

Warehouse and silos at Los Angeles



The two steel lime storage bins at Los Angeles distributing plant are of the same design as the kilns at the Sonora plant

A view of the main quarry at Sloan

General view of plant as seen from near the flux loading trestle at Sloan

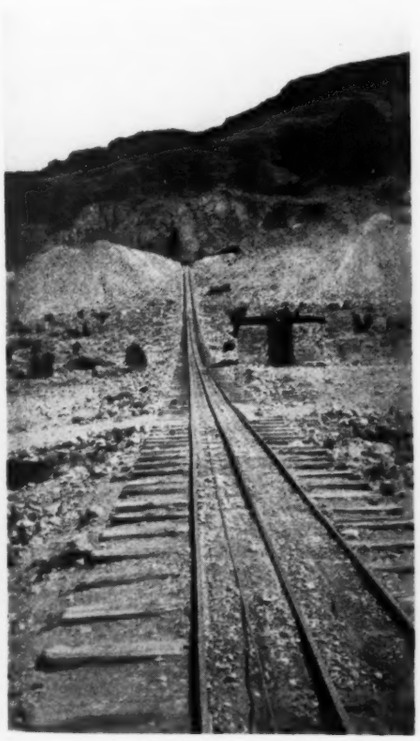
All three kilns were in operation and John Mocine, general superintendent of all the company's plants, was of the opinion that more kilns would have to be added to take care of the increasing demand for the product.

Both the high calcium and dolomitic limestones are hard and rather dense materials, and in the quarry face have at first glance the appearance of being massive; but on closer inspection, especially in the coyote tunnels used for blasting, the rock is fairly well broken by fine web-like seams with no foreign materials in the seams. As a result of this condition and due to the high quarry face the coyote-hole system of blasting is used with black powder as the explosive.

As the earlier operators attacked only the high calcium stone that ledge has been worked back so far at one point, that the overlying dolomite can be shot down direct so as to fall to the floor of the older high calcium limestone quarry, making it unnecessary to maintain a second quarry level or bench to get at the dolomitic stone. There is enough difference in the physical appearance of the two materials to easily keep them separate while hand loading, should by chance any high calcium limestone become mixed with the dolomite.

One of the illustrations shows some 60,000 tons of dolomite that had been shot down in this manner, and the place from which it came, 180 ft. above, was only a small scar, one might say, when compared to the enormous amount of material left above and in such shape that it too may later be dropped into the quarry floor. To operate the high calcium kilns other parts of the quarry are mined, as there are three different openings on the side of the mountain, two of which are served by suitable inclined tracks to the plant below, the third quarry being immediately alongside of one of the others and cars loaded there are shifted by hand to the incline.

The coyote holes are driven at right angles to the face for a distance of 30 to 50 ft. and short cross drifts are driven both ways from the ends of the main tunnels. Owing to the extreme height of the face it is seldom necessary to have over two coyote holes shot at the same time, as usually one tunnel will give sufficient stone to justify such a procedure. The holes are backfilled with the stone that is removed during the tunnel operations. The tunnels are roughly 3x5 ft. in cross section, and are driven under contract, costing $2.00 per



One of the inclined tracks connecting the Sloan plant and quarries

Interior of one of the worked-out stopes at Sloan

The calcium stone at Sloan lies between the dark lines, with the dolomite limestone in the foreground

ft., with the contractor supplying everything except the compressed air used for running the "Jackhamer" drills. About 6 to 7 tons of stone are secured per pound of explosive.

The stone is loaded by hand into steel cars made by the Joshua Hendy Iron Works, San Francisco, and are pushed to the head of the gravity tram, where the loaded car is used to pull up an empty. The cars are controlled in their drop down the steep incline by a home-made combination sheave and brake arrangement, and are delivered to a central point just behind the plant, where the two inclined tracks converge. At this location a standard gage switch has been run from the main line railroad passing under the incline tracks, and the quarry cars can be dumped direct to standard gage gondolas for loading fluxing stone, as the company ships considerable of that material to the steel mills on the Pacific Coast. The stone for fluxing purposes is shipped in lumps of from 6 to 30 lb. each, and the shipping and loading facilities are such that both grades of limestone can be shipped. In addition to fluxing stone a large quantity of limestone is shipped crude to the sugar refineries which burn their own lime.

Sheave and brake used in lowering loaded cars to the Sloan plant

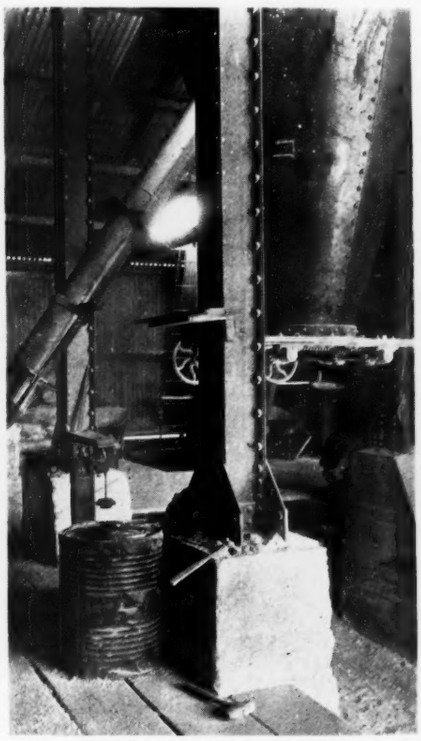
As this deposit is the closest one that has been opened up to any extent, or has a crushing plant in the district, there will be in all likelihood some of this stone used for construction of the Boulder Canyon dam, for the quality is such as to make it eminently satisfactory for concrete aggregate. The quarry location is only a few miles from the point where the spur connecting the main line of the Union Pacific and the dam site will take off from. However, in the event that some of this stone is used for that purpose additional crushing and screening equipment will probably be installed, as well as substitution of machine loading for the hand operation.

Cars containing dolomitic stone pass over the dumping trestle used for loading fluxing stone, and are switched from the main plant track to the foot of an incline where they are elevated to the tops of the three kilns. The kilns are each 30 ft. high from the firing floor, with an external diameter of 9 ft. 6 in., with the bottom of the kilns resting on a steel floor supported by steel columns well above the draw floor. The cooling zone and hopper have a total length of 9 ft. These kilns are of steel, lined with firebrick, the metal portions being supplied by the Western Pipe and Steel Co.

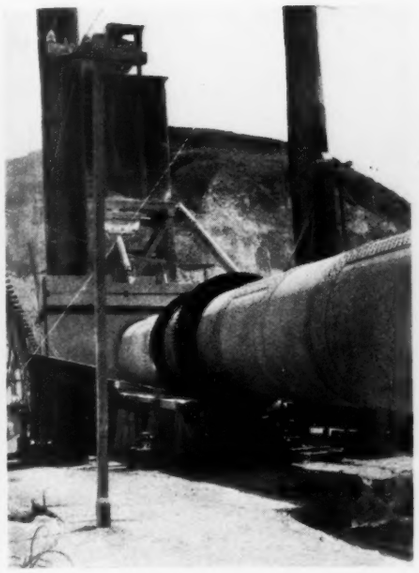
The kilns are fired with oil, using steam for atomizing the oil, with two burners located opposite to each other at the base of the kiln proper. The burner used was developed by the operators and extends into the fire box about 2 ft., and is so designed that it can be swung to one side when it is desired to poke down any lime or stone that has a tendency to hang up during the draw. Drawing is done every four hours, yielding 9 tons of stone per kiln per day of dolomitic lime, and when these same kilns are used for high calcium lime burning, 7.8 tons per day are secured.

The oil used for fuel is secured from the fields in southern California and is what is known as Dubbs oil, consisting of residual oil from the Dubbs cracking process. This oil is a heavy, tar-like substance but as it is purchased at a price well below that of other higher grade fuel oils it has proven more economical to use this type of fuel. There is no trouble in atomizing this oil or unloading the thick material from cars, as climatic conditions are such as to thin it down.

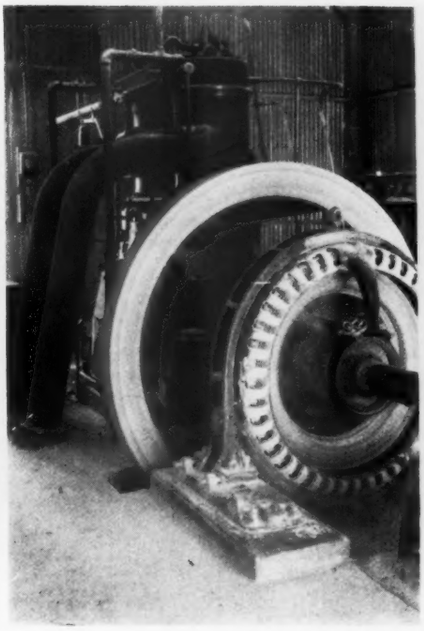
The lime as drawn is dropped to the cooling floor below and after cooling is wheeled to a Sturtevant rotary crusher, which discharges to a bucket elevator serving the feed bin of a Clyde hydrator. The hydrated lime, ground in a Raymond mill equipped with air separators and cyclone collectors, discharges to bins over the Bates valve-bag packer. Both dolomitic and high calcium lime hydrate are produced. The brands are "Arrowhead" hydrate and "Boulder Canyon" hydrate. The former is the name given the high calcium hydrate, and the "Boulder



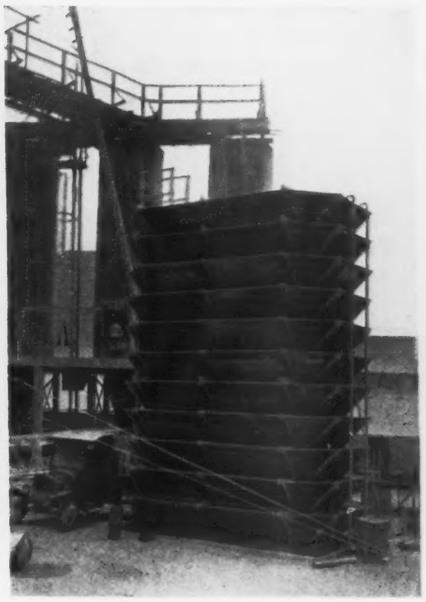
Hopper at right is usde for loading bulk lime and chute at left discharges to handle sacking lump materials at Los Angeles



Rotary kiln for burning high calcium lime at Sloan



Two Diesel units similar to the one shown here supply all of the electric power for driving the Sloan plant



Cooling tower, condenser in rear, for circulating distilled water to Diesel engines which drive the Sloan plant

"Canyon" brand is the dolomitic lime hydrate. Quicklime is also sold under the "Arrowhead" brand name. In event the lump dolomitic lime is wanted for shipment, facilities are available for loading that material direct to cars, either in 180-lb. steel barrels, 45- and 90-lb. fiber boxes, or in bulk. Recently quicklime has been shipped in paper-lined, burlap sacks, with good success; but not in the finely ground condition.

High Calcium Lime Burning

The high calcium stone for burning is pushed in cars from the foot of the main quarry incline to a 9- by 38-in. "Roller Bear" crusher, a product of the Alloy Steel and Metal Co., Los Angeles. This crusher is equipped with roller bearings. From the crusher the stone is elevated to a small revolving screen and any minus ¼-in. material is rejected as unsatisfactory for rotary kiln use. The screen discharges to two Vulcan rotary kilns, which are oil-fired. One of the rotary kilns is 8 by 100 ft. and has a capacity of 100 tons per day, and the other is 7 by 100 ft. with a capacity of 75 tons per day.

The burned stone as discharged from the kiln ranges in size from 2-in. down to ¼-in., and is a beautifully white product. The lime falls to a small hot pit serving a Link-Belt bucket elevator, that discharges to a 6-ft. by 40-ft. rotary cooler. From the cooler the lime is elevated to a small rotary screen which removes the minus 5/32-in. material that is stored separately from the balance of the lime in one of the four steel silos, each holding 75 tons.

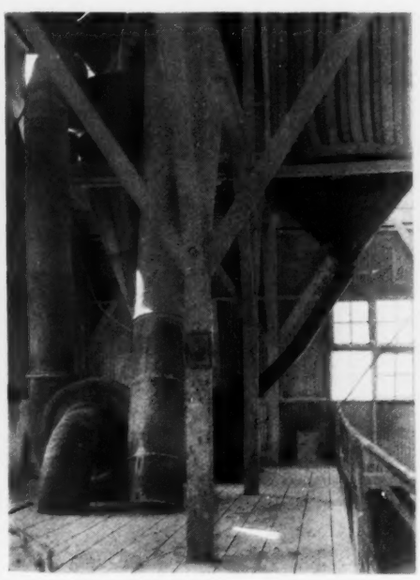
The lime from these storage silos can likewise be shipped in the same kind of containers mentioned in connection with the dolomitic limes, but it might be of interest to stress the point that at this point a large tonnage is shipped in paper-lined fiber boxes holding 45 and 90 lb. each. The shipping of lime in containers of this type is unusual, if not unique, and is conducted by filling the boxes from a chute, and after weighing, the boxes pass to a machine that sews the top, making a waterproof and airtight container. Most of the plant's output is loaded on order direct to cars, but there is a large warehouse available for convenience in filling orders promptly.

All of the units in the plant are driven by means of two separate 150-hp. Fairbanks-Morse Diesel engines, direct-connected to electric generators that supply the current necessary for the various motors in the plant. The Diesel engines are cooled by distilled water, which circulates through a set of Braun exchangers augmented by suitable spray towers. By using distilled water heat exchangers and coolers all tendency for lime incrustation to form is eliminated, were local high lime bearing waters used, and the installation has proven very economical as to cost and satisfactory as to performance.

Water for domestic and other purposes is secured from a 700-ft. well on the property.

Sonora Operation

Lime burning at Sonora, Calif., started during the early 60's; apparently no one knew the exact date that lime production started at this historically interesting mining town. Men were too busy following the

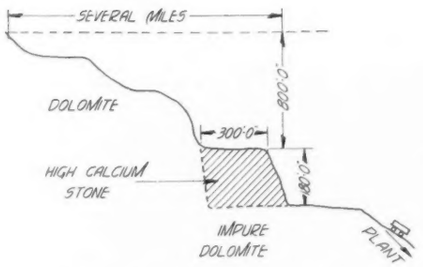


Fan and cyclone, as well as tubular collectors, discharge to sacking machine hopper

Fire end of the 8x100-ft. rotary kiln burning high calcium stone at the Sloan plant

lure of gold in this, the Mother Lode District, to pay much attention to a small lime kiln, the ruins of which still stand at the head of Rough and Ready gulch, a short distance below Sonora.

One can only surmise what the lime was then used for, probably to chink up the cracks in the miners' log cabins, or used for mortar for laying stone foundations. It is even within the realm of possibility that the cabin on Jack Ass Hill, seven miles northwest of Sonora, famed as the one-time home of Mark Twain, may have incorporated some of the lime from this old kiln. Very little lime was used in metallurgical work incidental to mining at that time, as placer mining was practically the only method used and did not call for the use of lime.



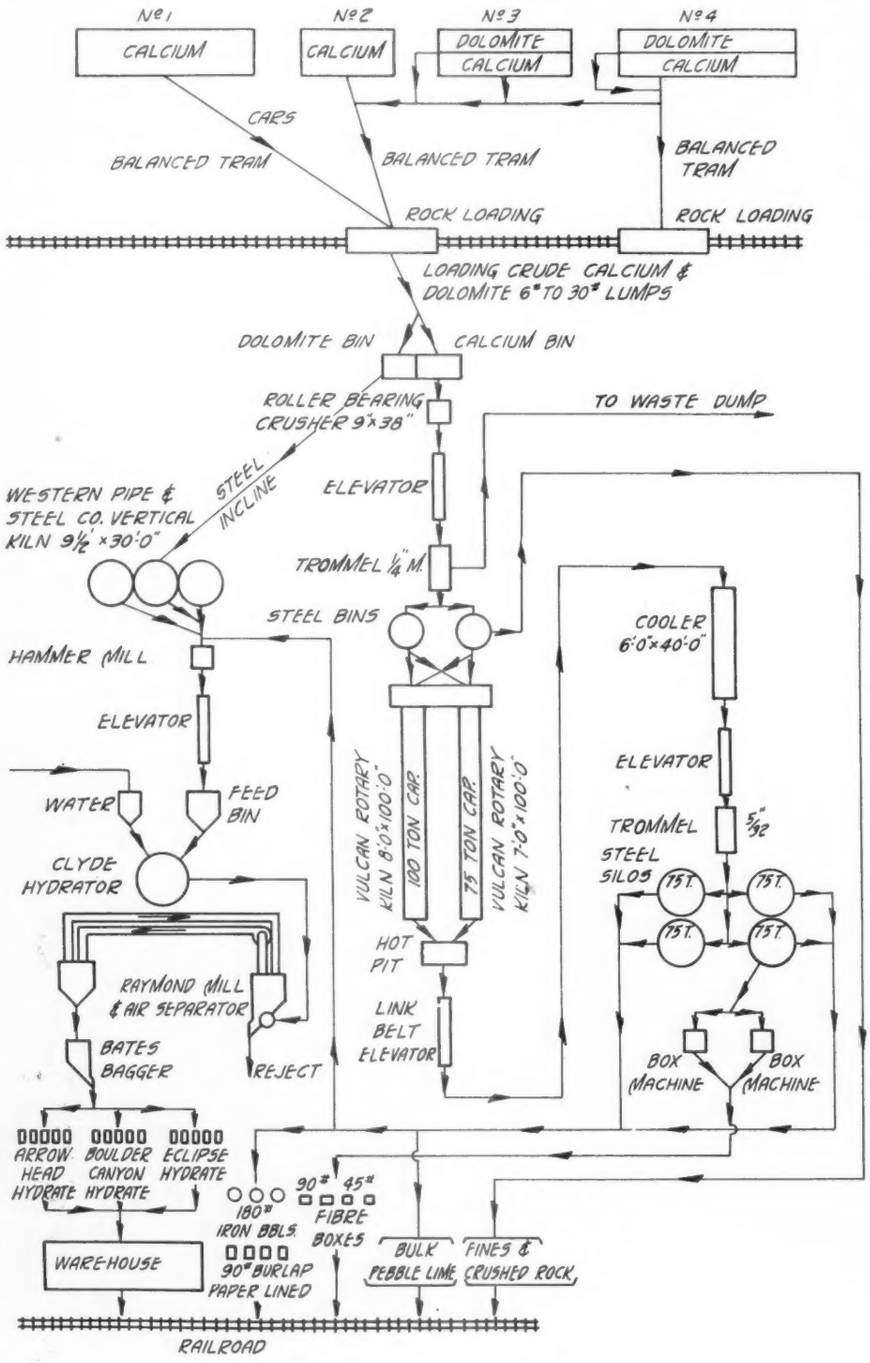
Cross section of deposit at Sloan operations

Sonora, Calif., is 130 miles east of San Francisco, and at one time was a bee hive of placer gold mining activity. Large and extremely rich placer gravels were worked in the areas surrounding the town and in the town itself. Even at the present site of the United States Lime Products Corp.'s lime plant gold was washed from the gravel beds in which the plant now might be said to rest. There is still some activity in mining, but it is only a shadow of former days. Mining men have either had to leave the district or direct their energies and knowledge in less alluring pursuits. In any event, with the exception of lumbering, the lime operation at Sonora is the largest single industry there now, giving employment to 50 men all the year around. Undoubtedly lime production will continue there long after mining and lumbering have been forgotten.

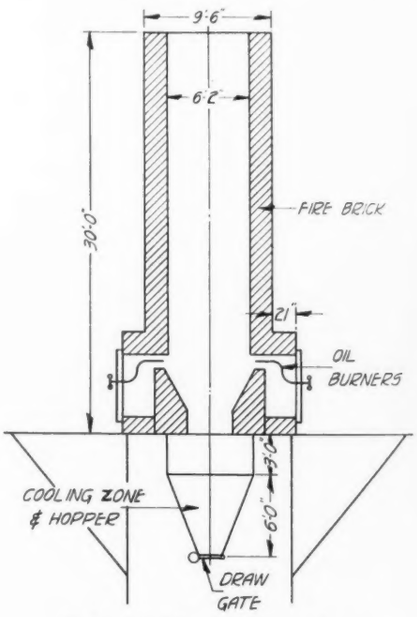
That men who lived most of their lives in the Mother Lode should want to remain is not surprising. Climatic conditions, both winter and summer are ideal, scenically beautiful, readily accessible by paved highway or by the Sierra railroad. Fishing and hunting in abundance are also added attractions.

The present lime plant of the United States Lime Products Corp. was formerly owned by the Pacific Lime and Plaster Co. The flow of material at this plant is diametrically opposite to that of the company's, Sloan, Nev., plant as at Sloan, where starting with a hillside quarry operation the products move down hill during progressive steps of manufacture, while at Sonora the opposite condition prevails. From the time the stone leaves the mine until loaded aboard cars the products move up hill.

At one time limestone was secured from pit operations, from two quarries, the North and the Central quarry; but soon after being taken over by the present owners a change



Flow sheet of the Sloan, Nev., plant



Dolomite kilns at Sloan plant

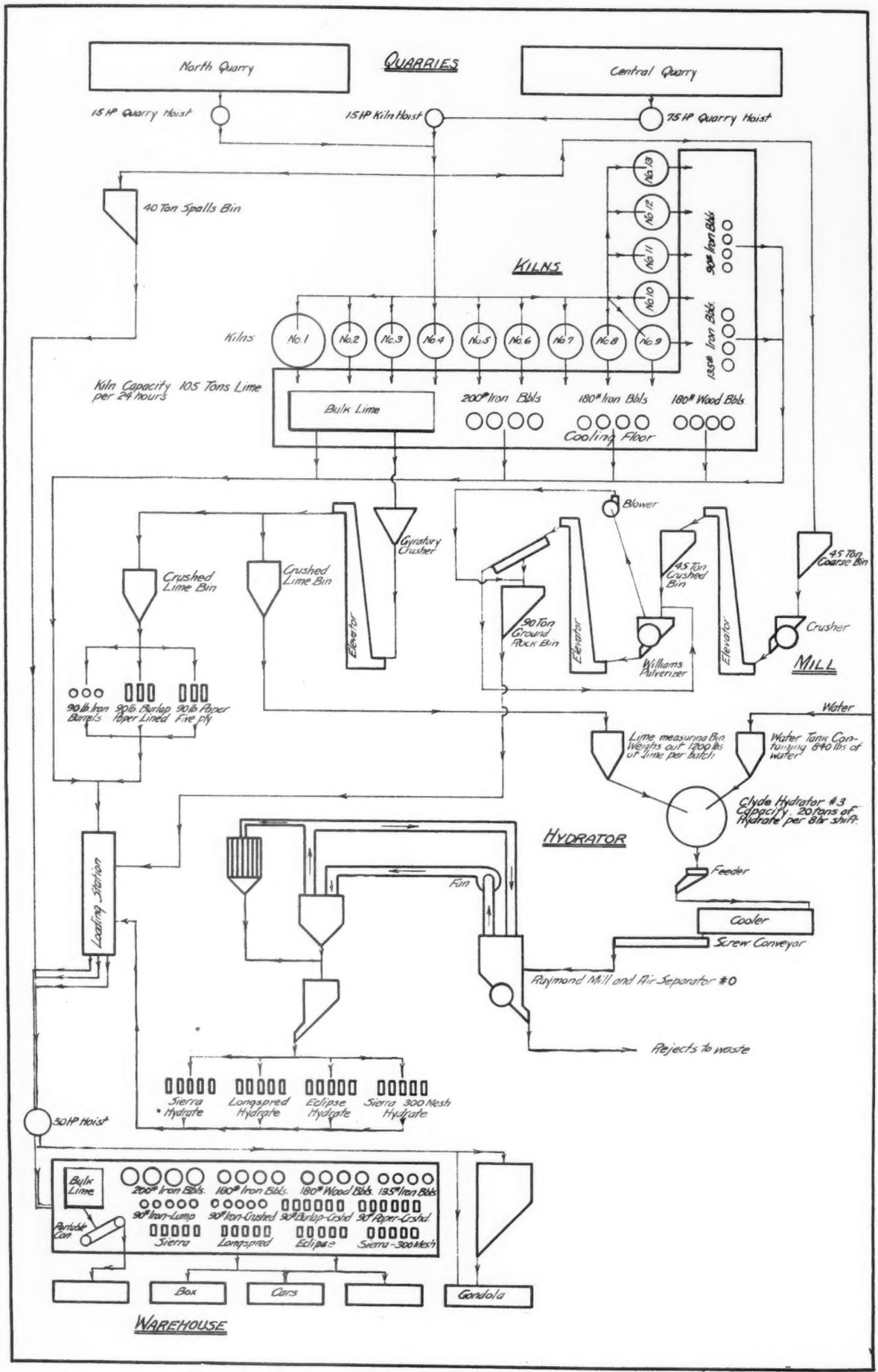
Some idea of the enormous deposit can be gained from this picture taken at Sonora

Back of the shrinkage stope at the Sonora plant

Drilling in one of the open stopes at Sonora

Part of the limestone still is taken from the Sonora quarry

John Mocine, general superintendent of all operations, U. S. Lime Products Corp., shown standing at upper collar of the shaft at Sonora, at right

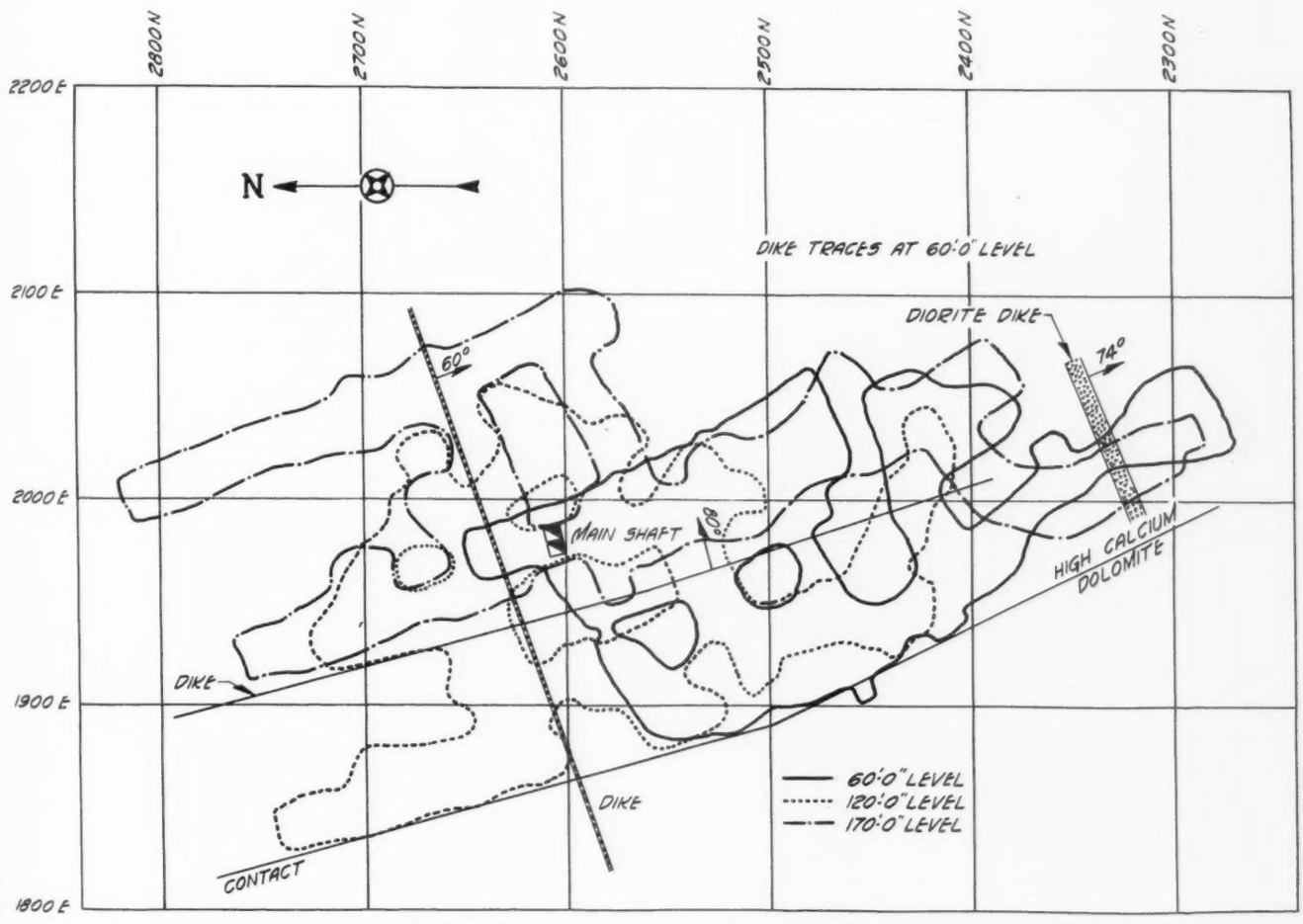


Flow sheet of the U. S. Lime Products Corp. Sonora operation

Ruins of an old kiln that supplied lime to the early miners, near Sonora

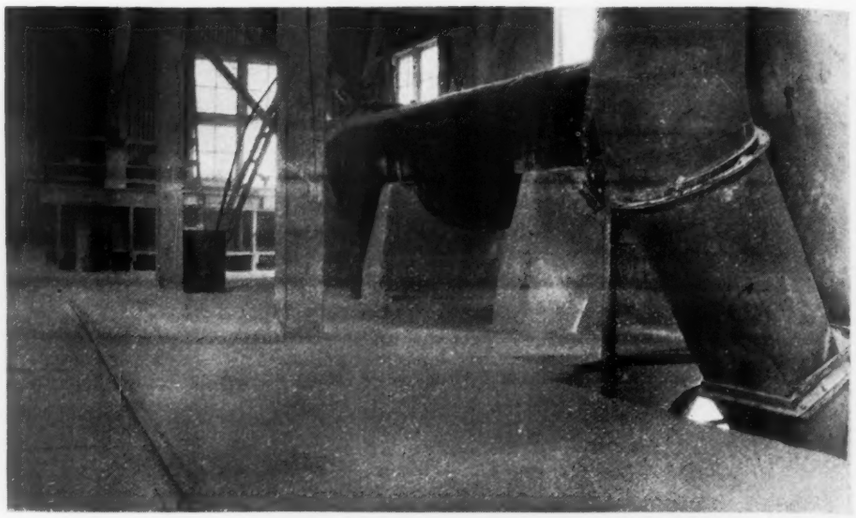
Head frame over the shaft that extends 170 ft. vertically from the old quarry floor at Sonora

from open-pit to mining operations was made. All the executives and operating heads of this company are experienced mining engineers. The change proved justified as they were able to produce a cleaner rock; saving all the spalls for glass manufacturing purposes, as well as producing cheaper rock. The lowering in costs was due in a measure to the nature of the overburden that daily was becoming heavier and harder to remove. The top of the deposit as well as the surface of the overburden is very irregular, making stripping difficult. Some limestone is still secured from the open quarry, but the bulk of the stone comes from stopes operated from short drifts driven into the limestone at the quarry level floor, or from development drifts driven from the 120-ft. and

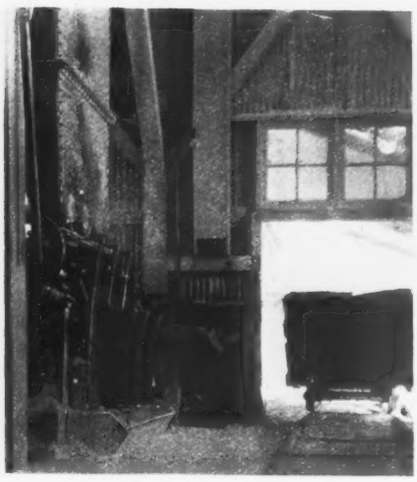


Central quarry of the U. S. Lime Products Corp., Sonora, Calif. Scale: 1 in. = 40 ft.

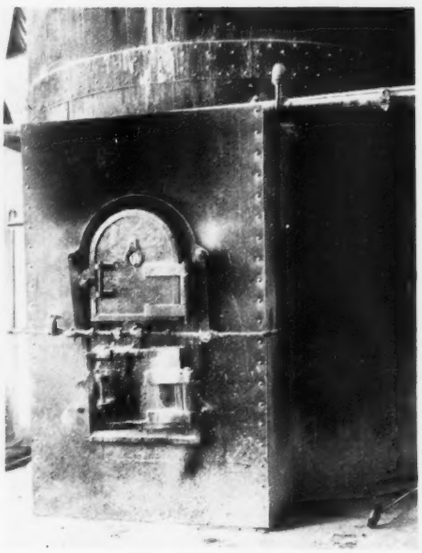
Dumping spalls to crushing plant for production of stone for glass manufacture at Sonora



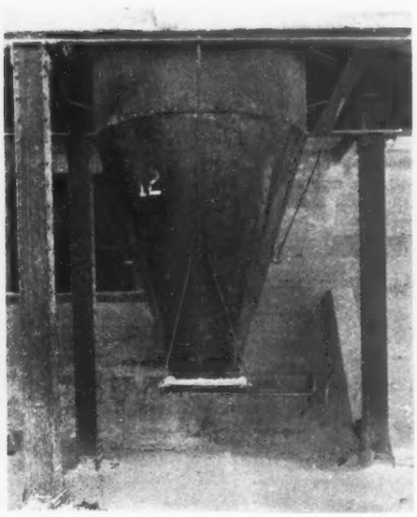
Lime cooler at Sonora plant



A car loaded with hydrate about to be pulled up the incline at Sonora to the shipping warehouse



Fire door closed showing location of oil burner at Sonora. At right—Fire door opened



Draw gate and hopper on one of the 9 1/2x30-ft. kilns at Sonora plant

Burnt lump lime is shipped to South America in these containers from the Sonora plant

170-ft. levels of the shaft, which has been sunk at one end of the Central quarry floor. When these drifts have been driven to the limits of the limestone deposit mining will be conducted using the shrinkage system.

In essence, this consists of shooting down the roof in successive slabs, removing only as much of the broken stone as to allow headroom for the miners to work, all the drilling operations being done from the top of the muck pile. When the roof or back has been driven upwards to the desired height, or breaks through to the surface, or the level above, all the loose rock on which the miners worked is removed. This can be either shoveled up or in some instances drawn directly into cars from chutes placed in position at the outset of stopping operations.

The stopes here will be 30 to 40 ft. wide, and their length will be governed by local conditions, as intruded diabase dikes cross the deposits; this to many might be considered a detriment, but in this case these dikes will be left in place to act as supporing pillars. No timbering is necessary except at the shaft collars, and there only enough to secure the cage guides; so far only a small amount of water has been encountered, which is pumped out from time to time with a 2-in. Cameron centrifugal pump delivering 250 g.p.m. at 200 ft. head. The pump is directly connected to a 25-hp. Westinghouse induction motor.

Partial view of the Sonora kilns, incline to railroad shipping warehouse in rear

The limestone is a highly crystalline material, almost a marble, white in color and will run 98% to 99% calcium carbonate. The line of demarcation between the limestone and the diabase dikes previously referred to is very sharp and samples of limestone taken even a fraction of an inch from this intrusion show no differences in chemical or physical composition.

Ingersoll-Rand "Jackhamers" are used for drilling, and the holes are loaded with "Giant" 40% dynamite. Air for drilling and general mill purposes is supplied by two Class G. W. 3 compressors, one a 10-in. by 10-in. and the second a 9-in. by 8-in., both belted to their respective motors.

The limestone mined from the two levels is hand loaded in 1-ton, end-dump cars and hoisted to the surface with a Denver Engineering Works, single-drum hoist driven by a 75-hp., variable-speed motor. The stone from the open stopes that connect with the bottom of the quarry is similarly loaded and hand trammed to the same hoist and hoisted to the upper rim of the quarry where the cars are again hand trammed to the foot of the incline serving the kilns and spall crushing plant.

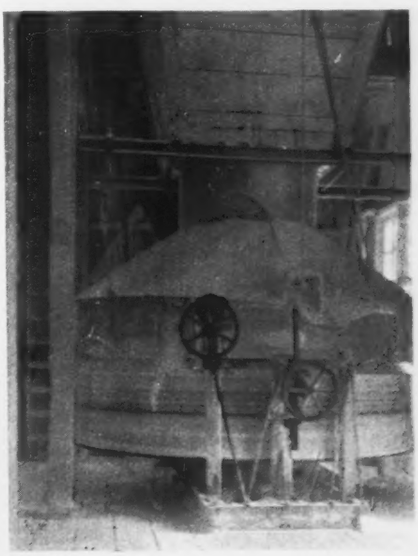
This incline is 600 ft. long and a Fulton Engine Works, single-drum hoist belted to a 20-hp., Crocker-Wheeler induction motor is used to pull the cars up the incline, one at a time. The hoist operator dumps the cars to the kilns or to the crushing plant.

As mining operations make it possible to secure clean stone as well as clean spalls, the latter are dumped to a 45-ton bin serving a "Hercules" jaw crusher. The crushed material is elevated to a second 45-ton crushed-stone bin from which the product is fed to a Williams pulverizer and again elevated to a Colorado impact screen. The oversize is returned to the Williams mill. The material is all ground to minus 20-mesh and is sold to glass manufacturing companies on the Pacific Coast. Provision is also made to ship spalls or crude limestone for any industrial use. A 15-hp. motor is required for the jaw crusher and a 40-hp. for the Williams mill.

There are 13 vertical kilns, all but one being of the company's own design. The remaining one, which is of larger size, is

Looking along the top of the Sonora kilns

Type of stone car used at the Sonora plant



A hydrator with capacity of 20 tons in 8 hours at Sonora

being rebuilt as a storage silo for crushed quicklime. Four of the kilns are 9½ by 30 ft. and are exact duplicates of those used at the Sloan, Nev., plant, where they are used for burning dolomitic limes. The other eight are 9 by 30 ft. Firing is done with oil having a B.t.u. value of 18,500 and the thermal efficiency of the smaller kilns was given as 45%.

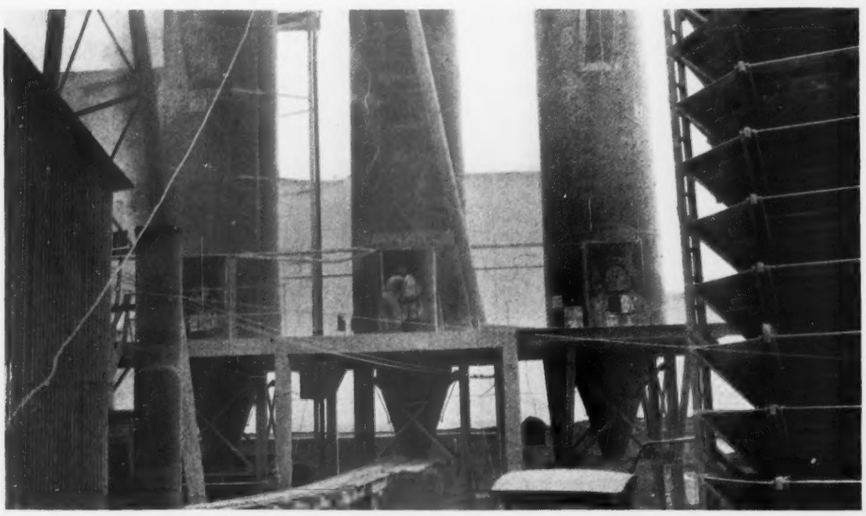
The kilns have a cross-sectional area of 38 sq. ft., and are producing 400 lb. per sq. ft. of fire-zone area. The larger kiln being made into a storage bin is 14 ft. in diameter and 30 ft. high, and while it was operated satisfactorily its production was practically the same per square foot of fire-zone area as for the smaller kilns. This large kiln was therefore cut out of service to enable greater storage capacity and production was concentrated in the smaller and more flexible kilns.

For each of the smaller standard kilns, 23,000 lb. of steel was required, which includes the cooling cone mounted below the kilns; 15,000 fire brick are required also for each kiln.

Stockton (Calif.) fire-brick linings are used in the fire zone and in the hotter portions of the shaft, and these last from 350 to 400 days; 1300 to 1500 fire-brick are then required for replacement.

The fire-brick lining starts at the fire floor and extends upwards for 10 ft. with a backing of common red brick, and behind these

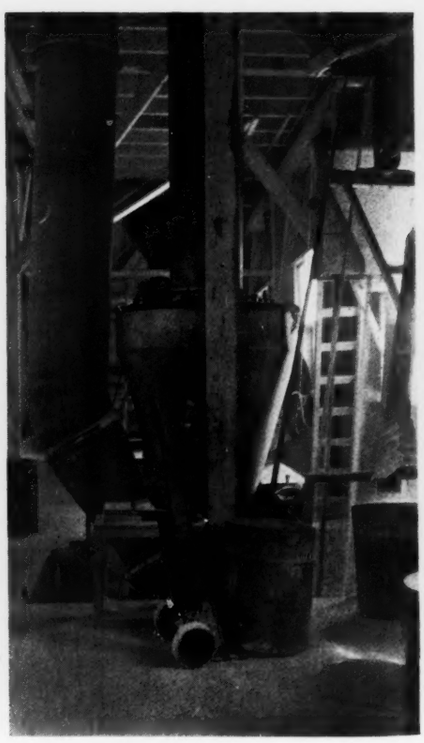
Building at right contains the hoist which operates the cage running in the shaft. Character and amount of overburden can be judged from this view at Sonora



A closeup of the three dolomite kilns at Sloan

General view of the kilns and hydrating plant as seen from the railroad shipping warehouse at Sonora

Fire floor at Sonora plant



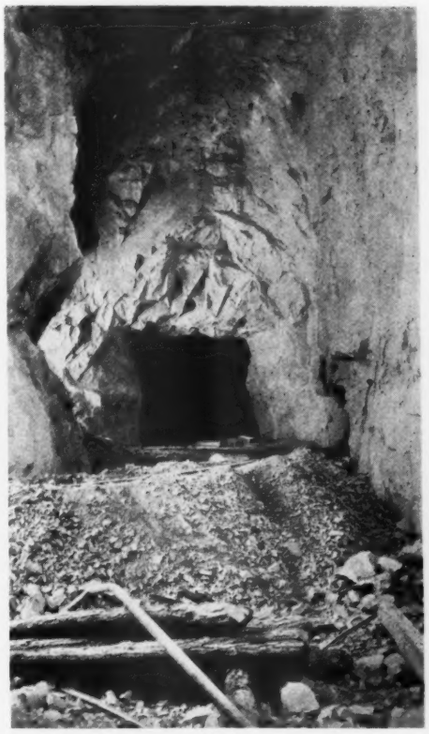
Hydrate pulverizer at Sonora plant

"Silex" insulation or lining fills up the space between the red brick and the steel shell. From the 10-ft. elevation a single lining of fire brick is used backed by a tier of red brick.

Oil is atomized with steam, the burners extending into the fire box. The burners are so designed that they can be moved to one side to poke down the lime during the draw. A 40-hp. Joshua Hendy, fire-tube boiler supplies the necessary steam. The burned lime is drawn every four hours through rack and pinion gates to the concrete cooling floor.

Bulk lime is delivered in wheelbarrows to the loading station at the foot of the 1000-ft. incline at the top of which is located the company's warehouse and railroad shipping facilities, or can be wheeled to the small Sturtevant rotary crusher, from which the crushed quicklime is elevated and spouted either to the new quicklime storage tank or to storage bins serving the hydrating plant. Considerable bulk lime is shipped to Peru, S. A., all of which is packed in steel cans holding 90 lb. each.

In 1924 the company installed a hydrating plant using a No. 3 Clyde hydrator having a capacity of 20 tons of hydrate per 8 hours. The hydrator and rotary cooler are both driven from the same 20-hp. Westinghouse motor. From the cooler the hydrate passes through a short screw conveyor to the No. 0 Raymond mill, equipped with a No. 11 Raymond exhauster fan, cyclonic dust collectors and tubular cotton filters for the recovery of dust from the cyclone vent. The cyclone dust collector and vent collector discharge to a small steel hopper mounted over the three-tube Bates valve-bag packer.



Entrance to one of the stopes that connects with the main Sonora quarry floor

The Raymond mill has a capacity of 20 tons per hour delivering a product 99.6% through 100-mesh and 98% through 200-mesh. The oversize from the mill is rejected.

All the products from the kilns, spall plant or hydrating plant are assembled at the loading station at the foot of the longer incline and loaded to flat cars holding 3 tons, and these are pulled up the incline to the car-loading station at the top of the hill. The Hendrie and Bolthoff hoist is driven by a 50-hp. Westinghouse motor.

Power is purchased from the Pacific Gas and Electric Co. and costs 1.4 cents per kw. The plant has a connected load of 427 hp., with about a 200-hp. peak.

Besides shipments of bulk lime in carload lots, and in the containers mentioned, this material is shipped in 200-lb., 180-lb. and 135-lb. steel containers. Also shipments are made in 180-lb. wood barrels.

Crushed lime is shipped in 90-lb. steel drums, 90-lb. burlap, paper-lined bags and in 90-lb., five-ply paper containers. The three brands of hydrate produced, namely "Sierra," "Longspred" and "Eclipse" hydrates are shipped in single 3-ply and 5-ply 50-lb. paper bags. The bulk lime is delivered from the cars on the incline to a storage bin at the car-loading terminal and loaded to box cars with a portable conveyor.

John Mocine is general superintendent of the U. S. Lime Products Corp.'s plants and S. L. Arnot is superintendent of the Sonora operations.

View of the quarry at Sloan as seen from the crusher. A story concerning a novel proposal for quarrying which will be carried out by General Superintendent Mocine is found on another page of this issue

Novel Proposal for Quarrying

Proposed Method of Quarrying 6,000,000 Tons of Aggregate for Boulder Canyon Dam

JOHN MOCINE, general superintendent of the United States Lime Products Corp., San Francisco, Calif., has proposed a novel method of coyote blasting in connection with the company's Sloan, Nev., operation, described in the foregoing pages. The method of operation to be used is only a *proposed* method and is submitted to interested parties as an outline as to what that company could do in the event that it is asked to supply aggregate for the construction of the Boulder Canyon dam on the Colorado river. Interested quarry men are invited to offer their criticisms or suggestions.

It is expected that when the need for aggregate arises a daily output of at least 10,000 tons will have to be supplied, which means under the ordinary coyote method of blasting that two or more quarries would have to be opened up and both quarries would have to be of considerable size, or a quarry face of great length provided for, so that entries could be driven from the face while loading was progressing at other points.

The deposits of the United States Lime Products Corp. are very favorably situated with respect to the dam, since they are located only a few miles from the spur that will connect the dam site with the main line of the Union Pacific Railroad. The deposit is of great size, being a veritable mountain of both dolomitic and high calcium limestones.

Mr. Mocine proposes to drive a main entry, or powder tunnel, starting at the eastern end of the mountain and extending back into the face, at an angle, until the depth from the face of the quarry totals 280 ft., at which point the main entry assumes a parallel position with respect to the quarry face for a total of 1550 ft. This tunnel will be of sufficient size to be used as a haulage tunnel for the muck that will be removed from 20 parallel coyote tunnels that take off at right angles from the main haulage tunnel and in the direction of the quarry face. The coyote tunnels will be driven with as small a cross section as can be conveniently worked in by the miners, and will be in this respect similar to those now used at the present quarry (3 ft. by 5 ft.). The coyote tunnels will stop about 40 ft. back from the quarry face. At the end of each coyote tunnel cross drifts will be driven (powder pockets) 25 ft. in length, in either direction. This will leave the two adjoining pockets 25 ft. apart.

An Invitation

HERE is a proposal that should interest all quarry operators and powder experts.

Perhaps the method described has been used successfully; or tried out and found impracticable.

In any event it furnishes the basis for an interesting discussion.

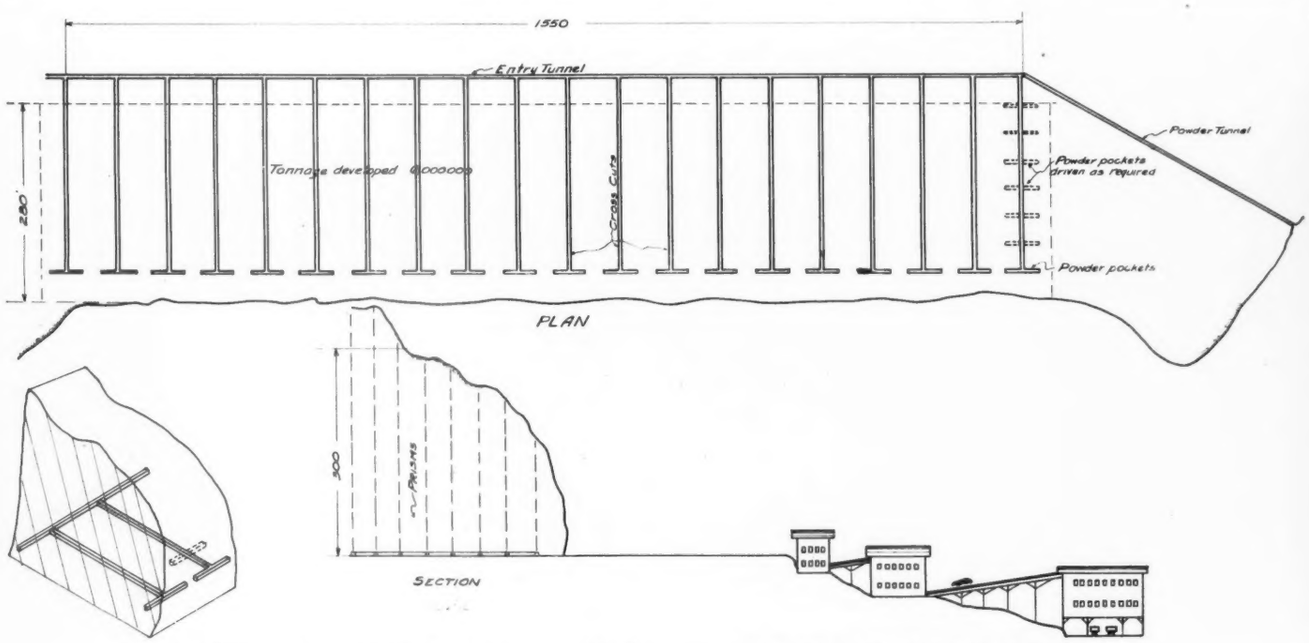
And the editors would like to have other operating men spread out their ideas in a similar manner.—The Editors.

Under the proposed plan the end powder pockets in each coyote tunnel will be loaded and a portion of the main coyote tunnels backfilled, after which the powder will be exploded. This will shear off a block of limestone 1550 ft. long, 40 ft. wide and to the height of the deposit, which at the outset will be about 200 ft. and later will extend up about 300 ft.

While the shovels are loading the first shot, the stemming in the main coyote tunnels will be removed and the second series of powder pockets loaded with the coyote tunnels again refilled with stemming in preparation for the second shot, which will follow the first when the need for stone arises.

The plan as outlined is only a general one and certain difficulties may arise and modifications may have to be made to keep the cut square as the face moves back. Actual experience, however, has proved that the entire bank of 300 ft. height will shear cleanly when shot from below as here planned.

The plan has several advantages to offer over the customary method of driving entries from the face of the quarry: (1) It does not require the removal of all the broken rock from a segment before the next opening is driven. (2) It enables immediate cor-



Sketch of the novel method of coyote blasting proposed by General Superintendent Mocine

rection to be made of defective shots or parts of one. Entry to the back is immediate and new pockets can be driven at once to bring down the bad portion. (3) As a result of experience gained from blasting down the first prism any other prism can be corrected in handling the subsequent one. (4) Powder men and miners are never exposed to ravelling or spillage from the high bank. (5) The entire face of the quarry is continuously available to the shovels, whereas under the general method only a portion would be.

Mr. Mocine, who suggests this novel idea for his quarry, makes the following interesting comments on its use:

"Of course, the plan would have a rather limited application as far as the average operation is concerned, but it does seem to fit the conditions here. It might also be worth consideration by operators who have long and high working faces, and are producing steadily a large tonnage over considerable periods of time.

"The footage of development work in the end for a given tonnage is about the same, and it would simply amount to prepaying a certain amount of it. In any event, the charge per ton for this item in the case of large outputs is almost negligible.

"The advantage of immediate correction of shots is apparent, and the availability of the entire working face continuously to the shovels and transport is an economic advantage.

"The fact that large amounts of broken rock will rest against the toe of the quarry when additional blasts are made is a distinct advantage. It will prevent bottom blowouts and will tend to force complete shearing of the prism of rock represented by a vertical projection of the area bounded by the face of the quarry and the powder pockets.

"While the matter is not important here, on account of the lack of rainfall or other weathering influences, the method also prevents the shovels working directly under faces which might have a tendency to ravel badly, where there was heavy rainfall, or extreme climatic changes.

Six thousand tons of dolomite were shot from the upper portion of this quarry at Sloan and dropped 180 ft. to the floor

"Also defective shots are frequent in the front method of attack—a common one being insufficient powder, in which case front correction or trimming is almost impossible. Entry from the rear would make the solution easy. In the case of a bottom blowout, the same reasoning applies. The top is then generally left dangerous, and hard to work under. Breaking the haunches of the arch from the rear would clean it up, or in extreme cases, a raise might be driven to a suitable point for a powder pocket.

"You will realize, of course, that the plan sent you is an ideal one only, and that in actual practice, the topography would be carefully plotted, and that spacing of cross cuts, length of powder pockets, amount of explosives, etc., would be modified to meet the topographic situation, and the structural characteristics of the rock itself."

Owing to the character of the deposit it is not considered practical or feasible to use well-drill blasting methods.

Under this proposal 6,000,000 tons of limestone will be shot down in progressive steps with a very low powder consumption. Development charges based on experience gained during the driving of the ordinary coyote tunnels in this quarry are estimated at 6 mills per ton of stone. The total length of all tunnel work will be 6000 ft.

Rock Products would be pleased to receive criticisms from operating men and explosives experts on their reaction to this proposal.

Another view of the result of the 6000-ton shot at Sloan

Growing Export Trade in Canadian Gypsum, Lime, Alabastine

NATION-WIDE in scope, Gypsum Lime and Alabastine, Canada, Ltd., has gypsum products mills at Caledonia and Lythmore in Ontario; Montreal in Quebec; Winnipeg in Manitoba and Port Mann in British Columbia as well as the one under construction in East Calgary, Alta. Lime products mills are operated at Hespeler, Elora, Puslinch and Limehouse in Ontario and Standard lime plants at Joliette, St. Mare des Carrierres and St. Emilie, P. Q.

R. E. Haire, president, recently announced that the old firm name, Canada Gypsum and Alabastine Limited, has been abandoned in favor of the more correct designation: Gypsum, Lime and Alabastine, Canada, Ltd.

The financial set-up of the company, Mr. Haire states, is in no way affected by the change. Second largest shipper over Canadian railways and largest commercial factor in the development of the Dominion's gypsum resources, Gypsum, Lime and Alabastine, Canada, Limited, like its predecessor, is entirely Canadian controlled.

Last April, five Ontario lime companies and lime properties were purchased and the Standard Lime Co. of Joliette was acquired and lime properties were purchased and the in August.

Growth of its export business is stated by company officials to be an important factor in the new plans. Products are being shipped to 35 different countries scattered all over the globe, and including Great Britain, a number of European nations, South Africa, China, New Zealand, and South America. This aspect of the business, which is of very recent development, will, company executives expect, be an increasing important item.—*Vancouver* (B. C.) *Financial News.*

Closed-Circuit Dry Grinding Improves Quality of Cement

And Increases Capacity—on Both Raw and Finish Ends—at Superior Mill in Ohio

DURING the past year the Superior Portland Cement Co. (subsidiary of the Wellston Iron Furnace Co.) at its plant at Superior, Ohio, has improved the quality of its product in keeping with the higher specification standards for cement, and at the same time has very materially increased its capacity, by a comparatively simple addition to the existing equipment. This was accomplished by the installation of a closed-circuit grinding and air separation system using Sturtevant separators in connection with tube mills on both the raw and finish ends.

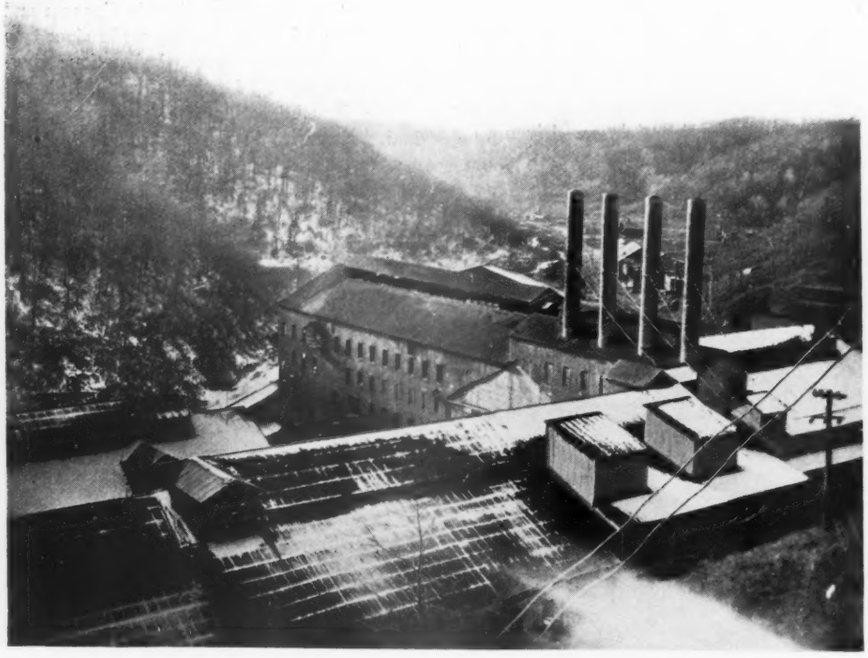
This plant is one of the dry-process plants using Bradley Hercules mills for preliminary grinding and tube mills for finish grinding. In order to obtain a desired greater fineness and capacity through the use of larger and longer tube mills, a considerable investment would have been necessary, so that it was decided to install an air separation system in connection with the existing tube mills at a considerably less cost, and the results obtained have entirely justified this decision.

Using this system also on the raw end resulted in an increased kiln capacity as well as an improvement in the quality of the clinker, and the output of the plant as a whole was increased some 40%.

Preliminary Experiments

Some preliminary experiments were made along the line of removing the 200-mesh and finer from the Bradley mill. There are air separator installations that are arranged so that the output of the Bradley mills goes first into the separators and the tailings to the tube mills, and the discharge of the tube mills back into the same separators, thus making an open circuit on the Bradley mills and closed circuit on the tube mills. There is said to be no objection to this method where the installation permits, but here it was desirable to make a coarser product with the Bradley mills to compensate for the additional tonnage, so the tube mills receive the product of the Bradley mills direct. On the finish end the product has a fineness of 95% through 200-mesh. On the raw end a fineness of 87% through 200-mesh has been found sufficient to give satisfactory results in the burning of the clinker.

Also during the year six concrete silos 20 ft. in diameter by 40 ft. high were added for storage and mixing of the ground materials on the raw end. These silos were built by the Burrell Engineering and Construction Co., Chicago, Ill.



Superior Portland Cement Co., Superior, Ohio.—view of plant, looking across from crusher house to finish grinding department

Mill

Limestone and slag are used for the raw materials, the limestone being mined on the property and the slag shipped in by rail from the furnaces near by. These materials are separately dried in rotary dryers and proportioned by Schaffer poidometers before going to the Bradley mill.

Removal of Iron from Slag

The iron is removed from the slag at three different points, first in the ordinary way by a short belt conveyor and a magnetic head pulley, and then further on at two points by a rather unique and unusual method which was worked out by the magnetic pulley company in accordance with the ideas of John Blank, the superintendent of the plant. The removal of the iron is so complete that there is no trace in the finished product, which does away with any danger of iron stain in the finished concrete and makes for a whiter cement.

The slag is pretty well broken up as received and is handled by locomotive crane from the cars to a hopper feeding a belt conveyor, which carries it to a bucket elevator and into a storage silo, from which it is fed to a hammer mill and over a short belt conveyor with a magnetic head pulley. Most of the iron is removed at this point, but in order to take out any remaining iron which may be incorporated with the slag, the material after being dried is run from a hopper over two successive magnetic pulleys which revolve slowly and also act as feed rolls. These are so constructed as to maintain a stationary magnetic field, only one half of each roll being magnetized.

In this way any remaining iron is carried part way around under these pulleys and separated in that way from the main body of the material. Since some of the slag is entrained and carried along with the iron, this material is discharged on a short, slow-moving belt conveyor, which has a third magnetic pulley of the same type located just above the discharge point of the belt conveyor. This pulley revolves slowly and is also magnetized half way around, with the magnetic field remaining stationary, so that the iron is picked up off the end of the belt conveyor, carried around on the bottom of the magnetic pulley part way, and dropped into a spout. This equipment was furnished by the Magnetic Manufacturing Co., Milwaukee.

Finish Grinding

The final grinding equipment on the raw end consisted of five 5½x20-ft. tube mills, but since the addition of the air separation system only four are used, and a 6-day per week operation provides material for the 7-day kiln operation.

The material from the four tube mills goes by way of screw conveyors and steel-encased buckets to two 14-ft. diameter Sturtevant separators, each driven by a 35-hp. motor. The tailings from the separators are spouted to a screw conveyor and are returned to the tube-mill feed. The material going from the tube mills to the separators has a fineness of 65% to 70% through 200-mesh, while the tailings going back to the mills have a fineness of 45% to 50% through 200-mesh. This would seem at first thought to be a rather ineffective method, with so much fine tailings continually being returned to the tube mills, but the circulation of the very fine material is quite rapid, and the slightly coarser material seems to materially assist in the fine grinding, so that rather than overloading the mills, the result is an increase of capacity.

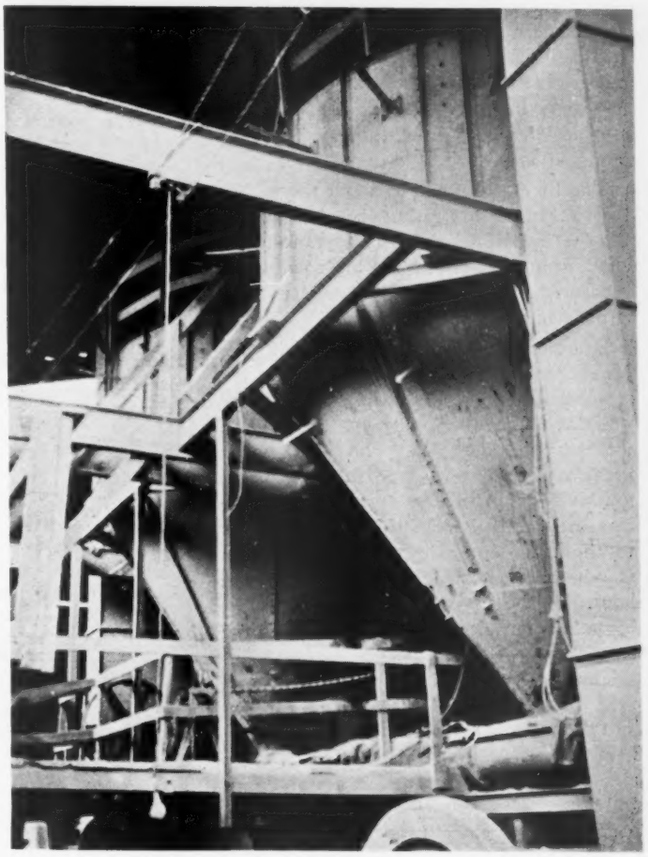
This ground material goes to one of the six silos previously mentioned, which are filled successively and sampled and analyzed. The kiln feed is drawn from one or two of these, so that any further corrective mixing desired may be done at this point. In this way the composition of the raw feed going to the kilns may be held to a very close standard, in about the same way as is done in wet-process plants.

Burning

Burning is done in five rotary kilns, 7½-ft. diameter enlarged to 8-ft. diameter at the firing end, and 125 ft. long. Pulverized coal ground in Fuller mills is used for fuel. The clinker may be run to storage, where it is handled by a Sauerman drag scraper, or may go directly to the finishing end in a drag conveyor. Preliminary grinding of the clinker is done with a Bradley mill, as in the raw end, the material then going to four 5½x20-ft. tube mills.

Finish Grinding

The discharge from the tube mills goes by screw conveyor and steel-encased bucket elevator to a 16-ft. diameter Sturtevant separator driven by a 40-hp. motor. The tailings from the separator are spouted to a screw conveyor and carried back to the elevator which feeds the bins over the tube mills, there joining the feed from the Bradley mill. This, as in the raw end, constitutes a closed-circuit grinding and separating system. About 35% of the feed to the separator goes back to the tube mill as tailings, of which 70% will pass 200-mesh. As mentioned under the raw end mill description, this constant circulation does not overload the system, but on the contrary helps in the fine grinding and results in an increased output of the fine sizes desired.



The two 14-ft. air separators on the raw grinding end

The finished cement is of such a fineness that 95% passes 200-mesh, with enough of the finer sizes (1000-mesh) to give the early and high strength desired. The conveyor and spouting arrangements at the tube mills are such that any part of the tube mill discharge may be bypassed around the separator if desired, which with the adjustments on the separator gives complete control and flexibility.

The tube mills are each driven by a 175-hp. 2200-volt Westinghouse motor through a silent-chain drive. The kilns are, of course, operated seven days a week, and the rest of the plant six days a week. The output of the plant is about 3250 bbl. per day.

Limestone and slag silos on the raw end

Mining

The limestone for the plant is mined from a 6-ft. vein of high calcium limestone on the company's property. It is overlaid with sandstone above and rests on shale below, with the limestone from 25 ft. to 75 ft. below the surface. This is in hilly country, the present operations being carried on in three different hills. A double-entry system of driving is used, with cross-openings every 60 ft. and fan ventilation, and with rooms of from 15 ft. to 35 ft. wide leading off from both sides of the entries. The deposit lies approximately horizontal, and a single 42-in. gage

track is used in each entry and room.

Two electric-motor-driven cutting machines, or channelers, are used, which cut an 8-in. horizontal channel 6 ft. deep in the shale at the bottom of the limestone vein and across the whole face.

The face is drilled horizontally with Jackhamers in two rows of holes about 6 ft. deep, one row about half way up and one row at the top. These are loaded with 30% gelatin, using 1⅛-in. sticks, to give a ratio of about three tons of rock per pound of explosive.

The fuses are timed to shoot the middle row of holes first, thus breaking down the lower half of the face first, followed almost immediately by the top row, which breaks down the upper half, so that there is little binding-in of the shot.

Drilling is done by six men with six Jackhamers, and all shooting is under the supervision of one man and is done after working hours. About 40 rooms are worked, and 30 loaders on piece work break and load the stone into the usual low end-dump, mining type cars. These cars are handled from the various rooms to the main entry by five 6- and 7-ton Goodman electric locomotives, and are hauled to the tipple at the crushing plant by a 12-ton electric locomotive of the same type.

The farthest workings are about one mile from the tipple, and the entrance into the mine is about one-fourth of a mile from the tipple. A total crew of 65 to 70 men is engaged in the mining operation, and about 600 tons of limestone are mined per day. The shale from the bottom of the cut is also loaded and transported to a separate tipple at the crushing plant, where it goes through a dry pan and is conveyed to a separate building. "Wifco" and "Sticktite" are two other products made by the company. The limestone goes through a No. 9 Allis-Chalmers gyratory crusher, and is carried on a belt conveyor to a storage silo at the mill.

General

The company owns some 10,000 acres of land and has an abundance of limestone and shale for many years to come. Some coal is also mined on the property, although it is not used in burning the cement.

In addition to manufacturing Superior brand standard portland cement the company makes a brick mortar in various colors under the name of "Wifco" mortar cement, and a stucco cement, also in colors, under the name of "Sticktite."

J. H. Frantz is chairman of the board of directors of the Superior Portland Cement Co.; S. E. Stephenson is president; M. L. Stephenson, vice-president; E. M. Poston, vice-president; Joseph McGhee, secretary; E. E. Horton, purchasing agent; F. E. Sheward, sales manager; John A. Blank, general superintendent; Victor Diefenderfer, superintendent; Fred Besco, chief chemist.

Victor J. Azbe on European Trip

VICTOR J. AZBE, consulting engineer, St. Louis, Mo., sailed from New York, April 12, for another European trip, a part of which will be devoted to investigating and studying European lime plants as a special representative of Rock Products.

Readers of Rock Products will recall Mr. Azbe's previous trip on a similar mission in 1927, and the resulting series of articles published in Rock Products, January 21, 1928, to February 2, 1929, on "Lime-Burning Practice Based on European and American Observations." This time Mr. Azbe has the benefit of two years' more active practice in designing and consulting service to the American lime industry, besides an extensive acquaintance with the lime industry of Europe and lime manufacturers of Europe.

Victor J. Azbe

Another series of articles in Rock Products, even more interesting and helpful to the industry, may be confidently expected.

Slight Decrease in Asphalt Sales in 1928

A 6.2% reduction in sales of paving asphalt, due chiefly to increased sales of other paving materials, led to a 2.3% decrease in 1928 in the total sales of solid, semisolid, and liquid asphalt prepared from petroleum. Statistics compiled by A. H. Redfield, of the United States Bureau of Mines, Department of Commerce, show a decline in sales from 3,654,340 short tons valued at $51,661,570 in 1927 to 3,572,274 tons valued at $46,268,546 in 1928. On the other hand, sales of road oil increased 45.8% in quantity from 297,110 short tons, or about 1,818,300 bbl., in 1927 to 433,255 tons, or 2,651,500 bbl., in 1928, and 22.8% in value, from $3,129,520 in 1927 to $3,844,439 in 1928. A good market for prepared roofing was reflected in enlarged sales of asphalt for roofing and waterproofing purposes. More asphalt was sold for miscellaneous uses, which included battery sealing compounds and binders for briquetting and other purposes, as well as paints, varnishes, enamels, coatings and insulating and preservative compounds as in former years.

Prices of nearly all grades were lower in 1928 than in 1927. The average sales value per ton of all asphaltic products, including road oil, fell from $13.87 in 1927 to $12.50 in 1928.

For the first time since 1921, refinery production of asphalt manufactured from petroleum decreased, from 3,817,539 short tons in 1927 to 3,542,941 tons in 1928. Substantial gains in the production of asphalt in the refineries of the Middle West and of California did not suffice to offset the lowered production of the Atlantic Coast and Gulf Coast refineries, which furnished 69.2% of the national output.

New Cement Plants Abroad

AT present a new cement mill to be called the Cia Americana de Cimento Portland, is under construction at Dumesnil, province of Cordoba, Argentina. The capital backing the enterprise is said to be almost entirely of Argentine origin and amounts to 10,000,000 paper pesos (about $4,000,000 U. S. currency). The plant is located near a rich limestone deposit; it will have two kilns; the wet process will be used; and it is estimated that fuel oil consumption will reach 100 tons per 24 hours. The capacity is said to be about 900,000 bbl. The machinery for the plant was purchased from the Polysius Co. of Germany.

A new cement plant to be known as the Yeng Kin Cement works, with a capital of Mex. $2,500,000 is to be established on one of the small islands of Tai Mu Lake near Soochow, Kiangsu province, China. Stockholders are prominent Soochow business men and officials. The Shanghai office is located at 9A Hankow Road.

The firm's engineer, Dr. Bergt of the German Polysius Works, supplying the machinery has submitted the following report after a visit to the island location of the plant:

The limestone found in the quarries of the eastern part of the Western Island is apparently of excellent quality. The uniformity of the material seems to be quite satisfactory. The quantity available for the cement manufacture is very considerable, as is the white clay found on the northeastern part of the island. Nearby coal supplies and transportation facilities are factors considered as favorable.

America's New Industrial Doctrines*

RECENTLY I returned from the United States where I made some study of the industrial revolution—for it is nothing less—that has taken place in that country. I do not for a moment say that American methods can be suddenly adopted elsewhere, but it is necessary that we should understand precisely what has happened. The United States has flung overboard our old conceptions of capital, profits, and wages. It has discovered that there are no such "laws" as were laid down by Adam Smith, Ricardo, John Stuart Mill, and even Karl Marx. It has largely gone back to the idealistic Socialism of William Morris—brought up to date by the development of machinery—and it has distributed its manufactured articles among all classes. Indeed it is wrong to use the word classes, for in the United States the caste system does not exist.

The keynote to American prosperity is simply this—that prosperity is only regarded as prosperity if it is shared by the whole of the people. A nation is not prosperous if its workers cannot buy the goods they themselves produce, if profits merely go into the pockets of a few privileged men. It is beside the point to allege that there is plenty of poverty in America, that there are greedy employers and moneygrabbing financiers. Doubtless there are. Ideals are not attained in a few years. But I affirm that there is throughout America an entirely new attitude towards social and industrial problems, and that, perhaps for the first time in the history of the world—certainly for the first time in the history of the modern industrial world—there is a general recognition that prosperity depends on the well-being and wealth of the worker; that the chief function of the employer is to make it possible for the worker to purchase freely; and that the secret of national success is not large profits and low wages, but low costs and high wages.

There is in principle—and the principle is widely accepted—no antithesis of wages and profits, of master and man, of producer and consumer. There cannot, in present conditions, be profits for anybody if the worker does not receive his share of them. There cannot, in a sensible community, be antagonism between the director—who is performing his job of continually eliminating waste, or organizing his factory in order to reduce overhead charges, of scrapping old machinery in favor of more efficient machinery, and generally of increasing output while decreasing cost—and the employe who should confidently help to produce more without the fear that he will be exploited, without the fear that he will not have his part in the product of his toil. There cannot be a struggle between producer and consumer, for in any rational society producer and consumer are not two persons but one. There must be complete co-operation and co-partnership of director, worker, and public.

Mass production there cannot be unless there is production for the masses. Production for the masses there cannot be unless the masses are well paid. So the rhythm of American industry is entirely different from the rhythm of European industry, where low wages are regarded as advantageous by employers, and where even the employes, through their trade unions, ask only for a so-called living wage—more or less above bare subsistence level, but always restricted by an imaginary limiting line as it is not restricted in the United States. The American (I speak broadly) has discovered that there need be no restriction in production, for saturation point will only be reached when every man and woman in the country has purchased everything that he or she requires; and we are a long way from that. He has discovered that there need be no restriction in earnings which are conditioned by production. Every improvement in the tools of labor—to which the employer gives his unremitting attention—naturally results in greater output. Greater output, provided it can find markets for itself, means a wide margin between the cost of production and the original purchase price. Thus there are potential profits. Now everything depends upon the distribution of profits at this stage. The American believes that the distribution should be threefold. Part of the profits should go to the public in the shape of cheaper goods. Part of the profits should go to the workman in the shape of higher wages. Part of the profits should be devoted to the business in the shape of available capital by which production can again be increased, wages raised, and goods cheapened. There can be no escape from this circle.

If the capitalist foolishly thinks that he can put the profits in his pocket, there will happen to him what has happened to the capitalist in other countries. His extra production will avail him nothing. It will be what is stupidly called overproduction—as if there can be overproduction while the wants of the world remain unsatisfied! If the goods are to be sold, the market must not be confined to a comparatively few comparatively rich men. It must be extended to the whole nation. But it cannot be extended to the whole nation unless the worker is well paid and the price of the goods is reduced. It is through an appreciation of these simple facts, which are obvious enough, but which nevertheless have never been appreciated fully outside America, that the American worker has been enabled to buy motor cars, wireless sets, encyclopaedias, washing machines, and what not, and has not been treated as a proletarian entirely cut off from his own products. America is continually striving for lower costs and higher wages, for they mean more profits, which, allocated to the provision of better equipment, to the further reduction of costs and the increase of wage, will yield, in an ever-expanding market, more profits, which can again be used in the same process. When one thinks how scandalously profits have been used elsewhere, how equipment has been neglected, how prices have been maintained, how the worker has been regarded as a docile wage-slave who is scarcely expected to buy his own goods, or to buy them in the smallest possible quantities, according to the ox theory of labor, it is not surprising that the blind devotees of the old political science have suffered, and that America enjoys unprecedented prosperity which belongs to capitalist, laborer, and public alike.

While labor is regarded as a commodity

Editor's Note

***ROCK PRODUCTS** prides itself on "hewing to the line"—on confining its pages strictly to technical and business matters relating specifically to the rock products industries. We invariably turn down articles of merely general interest, believing that our readers are also readers of current literature where they may have their fill of articles on economics, business and science generally.*

In this case we are making a rare exception because we believe this article is something every American industrialist should read and absorb, and probably many will miss it in the current popular literature.

The article is credited by the editor of the "Bulletin of the International Management Institute" (which is published in Geneva, Switzerland, in nearly all European languages) to Sisley Huddleston, an Englishman, and was originally published in the British magazine "New Statesman." Extracts of it have been published, we believe, in various American periodicals.

Every American producer will find it intensely interesting, not merely as the contribution of a foreign observer, but as a very clear and forceful exposition of what is still to most of us Americans a rather hazy subject—principles that most of us have accepted piecemeal and have come to believe in as a matter of experience, without probably ever having analyzed them as this writer has done.—Editor.

*Reprinted from the *Bulletin of the International Management Institute.*

to be bought in the cheapest market, in accordance with old economic doctrines, industrial success may well mean for the masses misery instead of prosperity; and in any event the worker will always be hostile to the employer and will, not believing in higher wages except in so far as he can enforce them, oppose rather than favor mass production. His aim will be the limitation of production; he will be more anxious to keep and create jobs than to earn on a bigger scale. In the United States there is a different mentality. The trade unions, believing that managerial success is to their advantage, persuaded that their members will not be exploited but will share in the benefits of costs reduction, have co-operated with the employers in an effort to reduce costs, and so in accordance with the new system to increase wages. There has been an actual financial co-operation of workers, who own stock estimated at more than a million dollars, and who are represented on the managerial boards. Wages, production and consumption advance together in proper proportions. I do not say that objections cannot be found to the American method. I am merely explaining the change that has taken place in America's conception of the so-called economic laws; and it is certain that in practice the changed conception has worked out well in the United States. Here is nothing short of a revolution in thought and in experience. Into all its implications I cannot enter here, but it is undoubtedly deserving of the closest study.

For my part I studied it in personal contacts with men who have accepted and applied the teachings of the new political science, and who are fulfilling their functions as leaders of industry conscientiously, thoughtfully, and strenuously, with the primary hope of rendering public service and not of mere profiteering. The idea of public service has taken hold of director and worker and is truly a dynamic force in the United States. I also studied the trend of economic thought in innumerable writings and compilations designed to explain and forward the movement for scientific management, better distribution, industrial peace, and national (truly national) prosperity. The clearest exposition, though it is of a popular character, is that of Garet Garrett in *The American Omen* (published by Dutton of New York). It is perhaps too flamboyant in style, and it contains a good deal of extraneous matter; but it is nevertheless an admirable piece of work which could be consulted profitably by everyone who is interested in the lessons that the United States can teach us. Its thesis is that the rationalization of industry is only possible if the worker shares in prosperity, and prosperity can only be defined as the highest standard, at a given moment, of common living—not as accumulated capital or as imposing dividends. And by the highest standard of common living is not meant something fixed; it must not be stationary, it must be perpetually mounting. The British and the French error is to cheapen costs and to keep wages down because wages are part of the costs. But there cannot be a real cheapening of costs unless the goodwill of the worker is won by high wages and unless the great bulk of the public is sufficiently rich to absorb mass production. I think Mr. Garrett effectively refutes the suggestion that America is rich because it sent goods, for which it has not been paid, to Europe during the war; doubtless the war stimulated production, but America became conscious of a new method, a new purpose. Nor is America favored so much by the possession of raw materials as is generally supposed; favored it is, but the same might be said of the British Empire. Europe gets all the raw materials it wants, and America has to buy—rubber, for example. Food supplies? Europe has always thought it profitable to exchange goods for food, and, anyhow, the prices are world prices. Internal markets? No European country has seriously tried to exploit to the full its home markets, and cannot unless its people are properly paid. Power? "If power is cheap in America," exclaims Mr. Garrett, "it is because we use it; it was not because it was cheap that we used it!"

So, without preliminary theorizing, America stumbled upon economic truths, more or less consciously, that contradict much of the old teaching of political economists. They may or may not be applicable to European conditions—at any rate, a revolution in European thought is needed to make them applicable. But if we are to keep our place in the industrial world, if we are to recover some measure of the prosperity we have lost (though it was never, in the American sense, national prosperity), it behooves us to examine without prepossessions and prejudices the phenomenon and the causes of the phenomenon of American prosperity.

Arkansas State Seeks to Collect Mississippi River Gravel Royalties

ALLEGING that sand and gravel having a royalty value to the state of Arkansas of $125,000 has been taken from the Mississippi river and royalty has not been paid, suit has been filed against the Greenville Stone and Gravel Co. and the Greenville Sand and Gravel Co. for this amount, in Chicot chancery court.

The suit was filed by R. W. Wilson, special counsel for the state, representing Hal Norwood, attorney general, and David A. Gates, revenue collector, and alleges that the companies in question are Tennessee corporations and that the alleged removal of gravel from the Mississippi river extends over a period of from January 15, 1917, to March, 1929.

The complaint alleges that the Greenville Stone and Gravel company, during the period from January 15, 1917, to May 15, 1928, removed gravel and sand from that part of the Mississippi river which lies on the Arkansas side, totaling 4,000,000 cu. yd., and on which a royalty should have been paid the state of 2½ cents per cu. yd.

Later, the complaint alleges that the Greenville Sand and Gravel Co. succeeded the original company and took over the same equipment and that from May 15, 1928, to date it is alleged that this company removed 1,000,000 cu. yd. of gravel and sand on which a royalty should have been paid the state of Arkansas of $25,000. That the companies now owe the state $125,000 in royalties.

The complaint asks the court to order the companies to bring into court their books and records and show the amount of gravel and sand which has been taken from the Arkansas side of the Mississippi and on which a royalty should have been paid.

If either of the companies fail to file with the court records relative to removal of gravel and sand from the Mississippi river, the court is asked to give the state judgment for the amounts sought in the complaint. That if the defendants file their records and books as asked in the complaint, the state asks for judgment for whatever sum found to be due.

The complaint also cites section 6790 of Crawford and Moses' digest, which provides that any person or firm who shall remove sand or gravel from any navigable river or lake without first procuring consent from the attorney general and without keeping a true and itemized statement, as required by law, shall be deemed guilty of a misdemeanor and shall be punished by a fine of not less than $300 and not more than $1,000 for each day of unauthorized taking of sand and gravel.

The court is asked to give the state, in addition to the royalty due on the gravel and sand, a judgment for a fine of not less than $300 and not more than $1,000 for each day the Greenville Sand and Gravel Co. has operated since March 1, 1929.—*Pine Bluff* (Ark.) *Commercial.*

Bellefonte, Penn., Lime Companies Combine

ANNOUNCEMENT was made April 9 of the promotion of Swengel Smith, of Bellefonte, to the post of general superintendent of the Chemical Lime Co., Inc., and superintendent of all construction. Mr. Smith was general superintendent of the former Chemical Lime Co., and since the consolidation of the Chemical with the Centre County Lime Co., his responsibilities will extend over the plants and operations of both the former companies.

Coincident with this appointment came the announcement that Earl C. Musser, former district superintendent of the West Penn Power Co., in Bellefonte, had been named superintendent of the plants of the new Chemical Lime Co., Inc.—*Williamsport* (Penn.) *Sun.*

Essential Properties of Molding Sands*

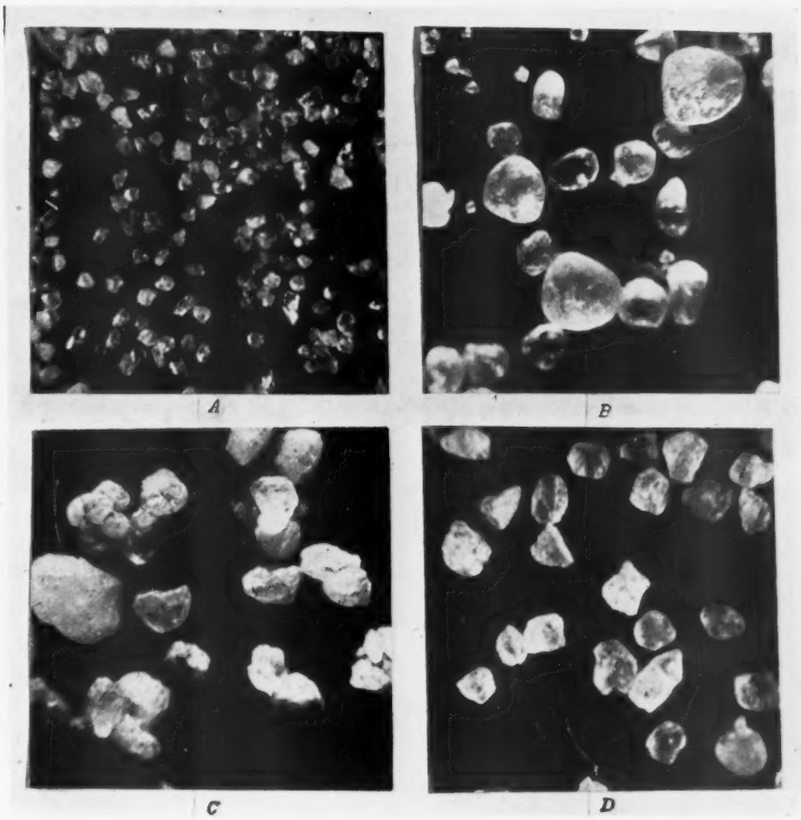
By A. H. Dierker
Research Engineer

AS EVERY FOUNDRYMAN realizes, the making of good metal is only a part and often the easiest part in the making of a good casting. The principles of metal melting and finishing have been extensively studied and are more thoroughly understood than those governing the shaping of the metal into its final form.

Castings since ancient times have been poured into sand molds. Various types of sand are used depending on the kind of casting being made, but in any case certain properties are essential in a sand before it can be considered satisfactory for foundry work. (1) Its very name indicates that a molding sand must be plastic, i. e., readily moldable into a given shape with the ability to maintain that shape against the pressure of the liquid metal. (2) The sand must be sufficiently refractory so as not to fuse when subjected to the heat of the molten metal. (3) A high resistance to spalling is essential. In the case of sands used for steel castings, the surface is raised 2600 deg. or more in temperature in a few seconds. This is a severe test for any refractory. Should spalling take place, a defective casting will result due to a "scab" or "drop out." (4) When molten metal is poured into molds a certain amount of gas is generated; perhaps a small amount escapes from the metal but most will be formed in the sand itself, and the sand must be sufficiently permeable to permit the ready escape of these gases to the outside of the mold. (5) The texture of the sand must be such that a desirable finish will be given to the surface of the casting. (6) In cooling from the solidification temperature metals shrink, and where sand is inclosed between two or more connected surfaces of the metal the sand must give sufficiently to allow for the solid shrinkage of the metal or the casting will be cracked.

The degree to which it is desirable to develop any of the foregoing properties in a particular sand will depend on the class of product being made. For a light, intricate, non-ferrous casting a rather weak fine-texture sand is wanted, while for a heavy steel casting a strong, refractory sand with a high resistance to spalling is essential. The degree to which these properties are actually developed depends on a number of closely related variables.

(1) Size and shape of the sand grains. The accompanying photographs of grains from different steel sands show how they may vary even when used for one type of work.



Samples of steel molding sands (13X)
A = Belgian; B = Ottawa, Ill.; C = Northeastern Ohio; D = Southern Ohio

(2) Grain size distribution; i. e., the proportion of grains of the various sizes in a given sand.

(3) Type of binder used (clay, bentonite, or other hydrated oxides, or organic materials).

(4) Physical condition of binder (fine or coarse, etc.)

(5) Amount of binder used.

(6) Amount of water used to develop the bond.

(7) Manner of mixing.

In studying the effect of these variables on the sand and ultimately on the casting, other variables must be considered, viz., the physical construction of the mold, the hardness and uniformity of ramming, the rate of pouring, and composition and temperature of the metal.

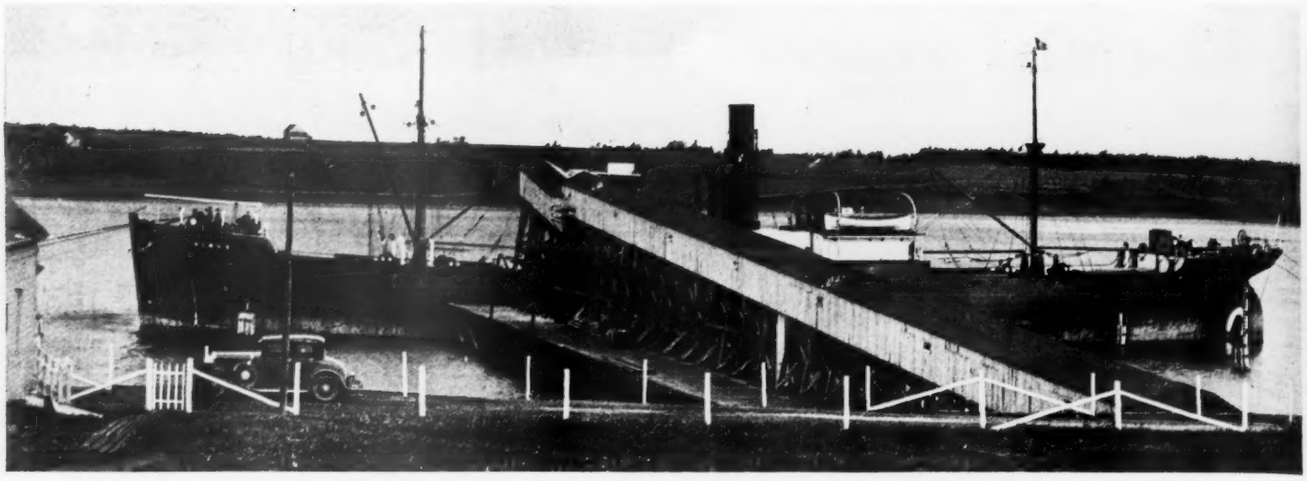
From the foregoing it can be readily seen that the study of the specific effect of the different variables is a rather complex problem and partially explains why so little definite information is available on the subject. Project 108 of the Engineering Experiment Station was established for the purpose of studying the effect of some of these variables on the essential properties of molding sands.

*Reprinted from the *Engineering Experiment Station News* of Ohio State University, Columbus, Ohio.

Huron Cement Building Toledo Packhouse

THE HURON PORTLAND CEMENT Co., with main offices in Detroit and plant at Alpena, Mich., and with packing plants at Buffalo, Cleveland, Detroit, Milwaukee and Duluth, is constructing an addition packing plant at Toledo, Ohio.

This plant is located on the river front in the downtown district and it is expected that it will be completed early in May. The storage will consist of three 33 x 80 ft. concrete silos with three star bins and with a total capacity of about 60,000 bbl. The packhouse in connection will be four stories high and of reinforced concrete construction. The construction is well under way with the silos practically completed. The Burrell Engineering and Construction Co., Chicago, Ill., has the contract for the construction.



Steamer being loaded with crushed gypsum rock at Atlantic Gypsum Products plant in Nova Scotia

Rock Handling Plant of Atlantic Gypsum Products Co. at Cheticamp, Nova Scotia

By O. A. St. Clair

Chief Engineer, Atlantic Gypsum Products Co.

WHILE the Atlantic Gypsum Products Co. continues to operate its quarry at Walton, Nova Scotia, near Windsor, on the Bay of Fundy, and has under development a new quarry at Aspy Bay, Cape Breton, for its supply of selected white rock to be used in the manufacture of gaging, molding and special plasters, the greater part of its crude gypsum rock is obtained from its quarries at Cheticamp, Cape Breton, Nova Scotia, where a large scale operation is conducted.

In addition to the rock used by its own plants, located in New York City, Portsmouth, N. H., and Chester, Penn., a large tonnage is sold to Canadian customers.

Shipping conditions are very satisfactory at Cheticamp harbor for the dispatch of steamers transporting the gypsum rock to Canadian and United States ports. The channel entrance has a present depth at low water of 19 ft., and the dredging necessary to provide a depth of 22 ft. is scheduled for completion during the coming summer.

The quarry, crushing, storage and loading plant, located at Cheticamp, N. S., is strictly modern in every detail.

The quarry, which is located approximately two miles from Cheticamp harbor, produces some of the highest quality gypsum rock that is obtainable in Nova Scotia. The present quarry face is 100 ft. high. Air, furnished by gasoline-driven compressors, is used to drill the rock for shooting.

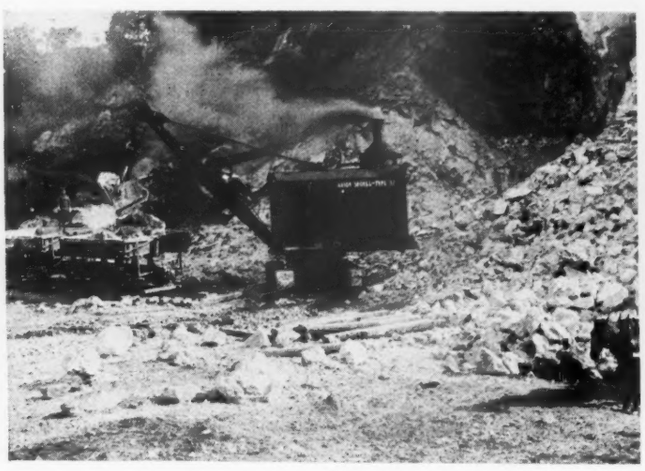
The rock is loaded into 10-ton, side-dump, standard-gage cars by means of one gasoline-operated and one steam-operated shovel.

Trains of 10 to 15 cars of rock are hauled by steam locomotives to the crushing plant, located at the harbor. Cars are switched in the quarry by gasoline locomotives.

The loaded trains are left in a lay at the foot of a 15-deg. incline, which leads into the crushing plant. One car at a time is hauled up this incline by means of a motor-driven friction drum hoist.

The cars are dumped directly into the primary crusher, which is a Fairmont 36-in. by 60-in., single-roll type, driven by a 150-hp. motor.

This crusher discharges through an apron



Loading gypsum rock in the quarry

Loaded rock on way to crushing plant

The working face in the old quarry

conveyor into a Webster-Inglis super-capacity continuous bucket elevator.

From this elevator the rock passes through a 6-ft. dia. by 19-ft. long revolving screen, the oversize from which passes through an 18-in. by 36-in. single-roll Pennsylvania crusher.

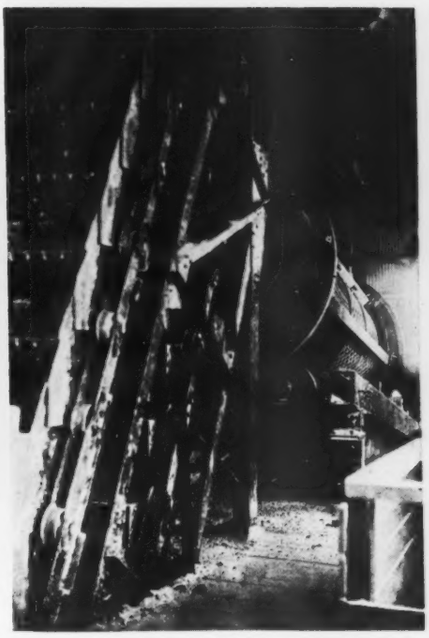
Two 24-in. belt conveyors carry the rock from the screen to the storage building.

Storage

This storage building has a capacity of 25,000 tons of crushed rock, and is constructed of concrete, structural steel and corrugated iron. Due to the extremely high winds which prevail in this country, the building is V-shape. It is virtualy a "peak" roof set on concrete foundations.

The building is 500 ft. long, with trusses every 20 ft. On account of being set on a hill, the lengths of the trusses vary, but the average spread at the base is 80 ft. The inside of the storage is clear of all columns.

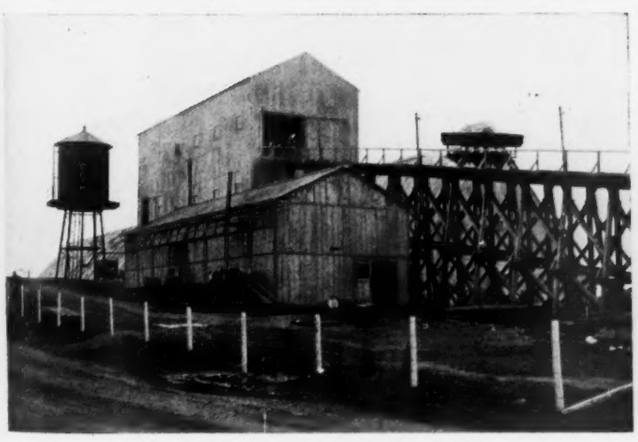
Extending the entire length of the storage building is a 10-ft. concrete tunnel, with a 30-in. belt conveyor running in



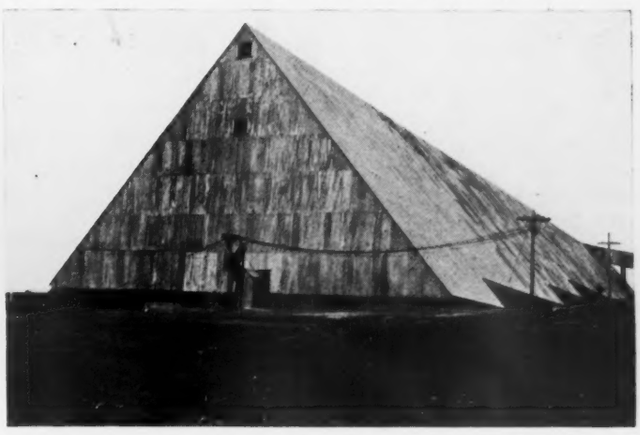
Large rotary screen and super-capacity elevator

24-in. belt conveyors from crushing plant to storage

Driving gear on primary crusher



Crushing plant and Diesel power house at the Cheticamp gypsum rock plant



Rock storage building, having capacity of 25,000 tons of crushed gypsum rock

General view of the loading pier, storage building and crushing building of the Atlantic Gypsum Products Co., showing portion of the village of Cheticamp, N. S.

the center of it. Gravity gates lead from the roof of this tunnel to the belt conveyor.

From the extreme far end of the storage building to the end of the pier, where boats are loaded, is a distance of over 1000 ft.

Two 30-in. belts with approximately 500 ft. between head and tail pulleys, convey the rock from the storage to a short loading conveyor. These belts have a capacity of 500 tons per hour at their present speed.

The belts were manufactured by Goodyear, and the troughing idlers are Stephens-Adamson, ball-bearing type.

The electric power for the crushing, storage and loading operations is generated by a Fairbanks-Morse 300-kw. generator, direct-connected to a F.-M. Deisel engine—salt water cooled.

Electric light is provided by a Kohler, gasoline-driven generator.

The cooling water for the engine is furnished by a motor-driven centrifugal pump, located at the harbor, and a pipe located in the loading tunnel brings the waste water back to the harbor.

Construction

Actual construction was started the last of October, 1928, and the first rock was loaded on board ship the latter part of May, 1929.

This is excellent time, when it is borne in mind that the nearest railroad is 40 miles from Cheticamp, and the plans were not started until the latter part of September, 1928.

Much of the material, such as piles for the pier, lumber, trippers, etc., was sent to Cheticamp from the United States on return trips of the rock boats.

The structural steel for the storage building was furnished by the J. W. Cumming Manufacturing Co., of New Glasgow, N. S.

The harbor of Cheticamp freezes over about the first of January, which fact was made use of in the construction of the loading pier. Holes were cut in the ice to permit driving of piles. The lumber for the pier was handled into place from the ice.

The engineering was under the direction of the author as chief engineer of the company; the construction was handled by J. W. McFarland, resident manager.

Gravel and Stone Men Join in Protest on Convict Competition

THE Illinois Stone Producers' Association and the Illinois Sand and Gravel Producers' Association recently petitioned the St. Clair County Supervisors to join them in an appeal to Gov. Emmerson of Illinois to modify his plan to have convicts in the state penitentiaries produce stone, sand and gravel for secondary state highways. The matter was referred to the judiciary committee of the board.

It was asserted the production of 200 cars of crushed stone and 1,000,000 cu. ft. of cut stone a week would impair enterprises in which $40,000,000 is invested and $3,500,000 paid out in wages each year.

National Lime Convention to Be Held in Chicago

THE NATIONAL LIME ASSOCIATION has picked the Edgewater Beach Hotel, Chicago, Ill., for its annual convention, June 3 and 4. Because of the serious problems facing the entire industry—the entire construction materials industry, as a matter of fact—a special effort will be made to get out every lime manufacturer who has sufficient interest in his business and his industry to pay his fare to Chicago.

New Quarry Plant for California

C. W. HARTMAN, sand and gravel producer of Bakersfield, Calif., recently announced construction of a new rock plant on Kern river and purchase of the Force, Currigan and McLeod plant on Cottonwood creek.

The new plant, nearing completion on a site at the base of China grade on Kern river, will be in operation within the next two weeks and will be capable of producing 300 tons of rock a day, Mr. Hartman said. The plant is located on a 40-acre tract leased from the Kern County Land Co.

The plant on Cottonwood creek, established by Force, Currigan and McLeod for the construction of the new highway to the Kern canyon, is located 10 miles from Bakersfield on 160 acres leased from the Olcese estate.

The deposit of rock has been approved and accepted by the state, 68,000 tons being used on the one job just completed.

The rock to be produced by the new plant is of highest grade and compares with the northern rock in strength and quality. At present virtually all of the rock used in this section of the state is brought from the north, necessitating a high price because of freight charges.

With both plants in operation, Mr. Hartman will be able to deliver from 500 to 600 tons of rock daily.

The rock business will be incorporated under the name of the Kern River Rock Co., he said, and will be operated separately from his sand and gravel business.

Mr. Hartman built the first sand bunkers here, owned the first dump trucks and brought the first steam shovel, to Bakersfield. Now his sand and excavating business is recognized as one of the best in the state.

A fleet of 21 dump trucks and five shovels operate from the Hartman yards on Oak street.

He has just finished 14 miles of roadway for Fred Nightbert in Inyo county as well as two and one-half miles on the Kern coast road, 16 miles west of Wasco.—*Bakersfield* (Calif.) *Californian.*

Plans Progressing for Mount Lime Plant in Virginia

THE Mount Lime and Chemical Corp., Lynchburg, Va., has plans for new plant at Natural Bridge, Va., where 350 acres was recently acquired, and will build several units for production of lime. A mining development will be carried out in connection with project for raw material supply of murat stone, of which extensive deposits have been secured. A dry-ice manufacturing plant is also planned. Entire project will cost more than $100,000 with machinery. W. D. Mount, formerly connected with Mathieson Alkali Works, Inc., Saltville, Va., heads new organization.

The Sand and Gravel Safety Contest of 1929*

The First Analysis Ever Made of Accidents in the Commercial Sand and Gravel Industry

By W. W. Adams

Supervising Statistician, U. S. Bureau of Mines, Washington, D. C.

THE UNITED STATES BUREAU OF MINES, in co-operation with the National Sand and Gravel Association, conducted a safety contest in 1929 among producers of sand and gravel. Only 26 plants were enrolled, as the contest was late getting under way. It is hoped that a much larger number of plants will be represented in the safety competition of 1930.

Two trophies, both of which were provided by ROCK PRODUCTS, were awarded at the end of the contest; one trophy was given for the best safety record among plants working 100,000 or more man-hours during the year and the other for the best record among plants working less than 100,000 man-hours. The trophies were presented to representatives of the winning companies on January 28, 1930, at the annual convention of the National Sand and Gravel Association at Memphis, Tenn.

Among the larger plants the best safety record was that of the American Aggregates Corp.'s Green Oak plant at Brighton, Mich. This plant worked 320,355 man-hours in 1929 and had 14 lost-time accidents which resulted in 92 days of disability. The plant's accident-severity rate was 0.287, representing the number of disability days per thousand man-hours of exposure to hazard. The best record among plants working less than 100,000 man-hours was that of the Urbana Sand and Gravel Co.'s plant at Urbana, Tex. The Urbana plant worked 62,261 man-hours in 1929 and had no lost-time accidents. Three other plants in this group also had no lost-time accidents during the year, but they did not equal the Urbana plant in the number of man-hours worked.

Honorable mention was awarded to the American Aggregates Corp.'s plant No. 1 at Columbus, O., and to the Yahola Sand and Gravel Co.'s plant at Keough, Okla., for establishing safety records which were second only to those of the winning plants in their respective groups of large plants and small plants. The plant at Columbus, O., had an accident-severity rate of 1.353; the Keough plant had no lost-time accidents during the year.

Perhaps the most significant facts revealed by the contest records were the average accident rates for all of the plants combined. The contest as a whole covered 2,259,572 man-hours of exposure, and there were 168 lost-time accidents during the year. These accidents, weighed in accordance with standard practice, caused 21,947 days of disability. The accident-severity rate for the 26 plants was therefore 9.713 per thousand man-hours of exposure; the accident-frequency rate was 74.350 per million man-hours. The severity rate is usually considered the best index of the relative hazards of different industries or of different plants. One of the smaller plants had an unusually high accident-severity rate because, with only a small number of man-hours worked the plant had an employe killed by accident, which resulted in a charge of 6000 lost-days against the plant's record. If the record of this plant were not included, the accident-severity rate for all plants in last year's safety contest would be 7.077 instead of 9.713.

Comparative figures for other branches of the mineral industry are not available for 1929, but the accident rates for sand and gravel plants for that year may be compared with similar rates for representative mines and quarries for 1928, as follows:

	Frequency rate†	Severity rate†
Anthracite mines	88.116	10.918
Bituminous coal mines	84.959	12.471
Metal mines	52.123	9.511
Nonmetal mines	52.689	7.935
Quarries and open-cut mines	29.327	5.208
Sand and gravel plants	74.350	9.713

From the foregoing accident-frequency rates, it would seem that, for any given number of employes accidents occur less frequently at sand and gravel plants than at coal mines, but more frequently than at metal and nonmetal mines and quarries and open-cut mines. The accident-severity rate for sand and gravel plants was also more favorable than that of either anthracite or bituminous coal mines, and, had it not been for the fatality at the small plant previously referred to, the rate would have been better than that of any other group except quarries and open-cut mines.

The number of man-hours on which the foregoing accident rates were calculated represents the equivalent of 9,519 men working eight hours a day for 300 days at anthracite mines, 12,212 men working the same length

†Accident-frequency rates indicate the number of lost-time injuries, fatal and nonfatal, per million man-hours of exposure. Accident-severity rates indicate the number of calendar days of disability from accidents per thousand man-hours of exposure.

TABLE 1—SAND AND GRAVEL SAFETY CONTEST, 1929: ACCIDENT DATA FOR INDIVIDUAL PLANTS*

R'nk	Type of plant	Hours worked	—Number of accidents†— F.	P.T.	P.P.	T.	Total	—Number of days of disability†— F.	P.T.	P.P.	T.	Total	†Frequency rate	†Severity rate
1	Bank	18,495	0	0	0	0	0	0	0	0	0	0	.000	.000
2	Bank	41,220	0	0	0	0	0	0	0	0	0	0	.000	.000
3	River	42,699	0	0	0	0	0	0	0	0	0	0	.000	.000
4	Wet Pit	62,261	0	0	0	0	0	0	0	0	0	0	.000	.000
5	Bank	34,243	0	0	0	1	1	0	0	0	1	1	29.203	.029
6	Wet Pit	71,217	0	0	0	4	4	0	0	0	5	5	56.166	.070
7	Wet Pit	79,138	0	0	0	3	3	0	0	0	7	7	37.908	.088
8	Bank	29,915	0	0	0	2	2	0	0	0	4	4	66.856	.134
9	Bank	70,591	0	0	0	1	1	0	0	0	14	14	14.166	.198
10	Wet Pit	66,097	0	0	0	1	1	0	0	0	19	19	15.129	.287
11	Wet Pit	320,355	0	0	0	14	14	0	0	0	92	92	43.702	.287
12	River	38,362	0	0	0	3	3	0	0	0	15	15	78.202	.391
13	Wet Pit	43,864	0	0	0	2	2	0	0	0	21	21	45.595	.479
14	Wet Pit	87,126	0	0	0	6	6	0	0	0	76	76	68.866	.872
15	Dry Pit	48,448	0	0	0	3	3	0	0	0	46	46	61.922	.949
16	Wet Pit	79,055	0	0	0	7	7	0	0	0	76	76	88.546	.961
17	Wet Pit	176,623	0	0	0	24	24	0	0	0	239	239	135.883	1.353
18	Wet Pit	136,471	0	0	0	16	16	0	0	0	265	265	117.241	1.942
19	Bank	174,624	0	0	1	4	5	0	0	300	43	343	28.633	1.964
20	River	40,342	0	0	0	5	5	0	0	0	81	81	123.940	2.008
21	Bank	189,249	0	0	0	31	31	0	0	0	537	537	163.805	2.838
22	Bank	133,955	0	0	0	25	25	0	0	0	769	769	186.630	5.741
23	Bank	104,491	0	0	1	2	3	0	0	1,200	52	1,252	28.711	11.982
24	Bank	94,181	1	0	0	3	4	6,000	0	0	9	6,009	42.471	63.803
25	Bank	70,412	1	0	0	6	7	6,000	0	0	76	6,076	86.292	99.414
26	Bank	6,138	1	0	0	0	1	6,000	0	0	0	6,000	162.920	977.517
		2,259,572	3	0	2	163	168	18,000	0	1,500	2,447	21,947	74.350	9.713

*As the accident reports from mining companies are considered confidential by the Bureau of Mines, the identities of the mines to which this table relates are not revealed.

†Frequency rate indicates number of fatal, permanent and other lost-time accidents per million man-hours of exposure; severity rate indicates number of days lost from accidents per thousand man-hours. F. indicates "fatal"; P.T., "permanent total disability"; P.P., "permanent partial disability"; T., "temporary disability."

*Reprinted from U. S. Bureau of Mines Report of Investigations 3009.

of time at bituminous coal mines, 6,883 men at metal mines, 1,218 at nonmetal mines, 8,397 at quarries and open-cut mines, and 941 at sand and gravel plants.

Records covering only 26 plants do not lend themselves to much subdivision for studying the relative risks of different types of sand and gravel operations. However, for want of more voluminous records, the reports have been divided into three main groups, which include 12 sand and gravel banks, 11 pits (10 wet and 1 dry), and 3 river operations. Should enrollment be larger in future contests, it is probable that the following classification would be found desirable:

1. Bank
2. Pit
   (a) Dry
   (b) Wet
3. Marine
   (a) River
   (b) Lake
   (c) Ocean

In this classification a bank is defined as a sand and gravel operation where the deposit lies at a greater elevation than the working level of the plant; a pit is a plant where the deposit is lower or beneath the working level. A pit may be wet or dry; if wet, it may be by artificial or natural flooding. A marine plant is one where the deposit lies under a river, lake or ocean.

Comparative data for each type of operation represented in the safety contest are given below for the 26 plants which reported for 1929.

COMPARISON OF ACCIDENT RATES FOR THE 26 PLANTS REPORTING IN 1929

Type of plant	No. of plants	Man-hours	Accident rates—Frequency	Severity
Marine (river)	3	121,403	65.896	0.791
Pit (wet)	10	1,122,207	68.815	0.713
Pit (dy)	1	48,448	61.922	0.949
Bank	12	967,514	86.686	21.710
Total	26	2,259,572	74.350	9.713

The accidents on which the above rates are based were classified as follows:

CLASSIFICATION OF ACCIDENTS

Type of plant	Fatal	Perm. total	Perm. partial	Temp.	Total
Marine (river)	.....	.....	.....	8	8
Pit (wet)	.....	.....	.....	77	77
Pit (dry)	.....	.....	.....	3	3
Bank	3	.....	2	75	80
Total	3	.....	2	163	168

DAYS OF DISABILITY

Type of plant	Fatal	Perm. total	Perm. partial	Temp.	Total
Marine (river)	.....	.....	.....	96	96
Pit (wet)	.....	.....	.....	800	800
Pit (dry)	.....	.....	.....	46	46
Bank	18,000	.....	1,500	1,505	21,005
Total	18,000	.....	1,500	2,447	21,947

Omitting the figures for the dry pit because they represent the experience of only one plant, the foregoing figures show that river operations had fewer accidents in proportion to the number of man-hours worked than either pits or banks, and that the record for wet pits was more favorable than that for banks. From the standpoint of the severity of accidents, which represents the number of days lost in proportion to the number of man-hours worked, the best record was that of wet pits, with river operations occupying second place with a rate almost as favorable as that of the pits, and third place occupied by banking deposits. Three fatalities at sand and gravel banks gave that type of operation a high accident-severity rate, 21.710 days lost per thousand man-hours worked. If it had not been for these fatalities, the accident-severity rate for banks would have been 0.311 and more favorable than that of any other group.

When all of the plants were grouped into two classes, those working less than 100,000 man-hours and those working 100,000 or more man-hours, the figures showed fewer accidents at the smaller plants for any given number of man-hours of exposure. This is contrary to the usual condition at metal mines and quarries and it may be that reports covering a larger number of sand and gravel operations would tell a different story. The accident-frequency rate was 48.837 per million man-hours for the smaller plants as compared with 95.487 for the larger plants, the former rate being based on 1,023,804 hours and the latter being based on 1,235,768 man-hours. No comparison is drawn between the accident-severity rates for the two groups because the rate for the smaller plants was raised abnormally by the occurrence of three fatal accidents with a charge of 6,000 lost days for each fatality.

The relative standing of the 26 plants that participated in the safety contest of 1929 is shown by the Table 1. An examination of the figures in the table shows that the average period of disability following each temporary injury was 15 days. This figure represents the "healing period" or the average length of time required for the injured employe to recover sufficiently to return to work. The average healing period for temporary injuries varied with the type of plant, being 12 days for river operations, 10.4 days for the dry pit, 15.3 days for wet pits, and 20 days for banks.

In calculating the accident-severity rates of the various plants, temporary injuries were charged with the actual number of days during which the injured employe was disabled, except that the day on which the accident occurred was not counted. Deaths and permanent injuries were charged with the number of lost days shown in the scale, Table 2, which is the scale adopted by the Association of Industrial Accident Boards and Commissions.

Reports covering the three fatalities which occurred during the contest period showed that one man was killed while he was leaning against the frame of a crane; the crane swung around and caught the man between frame and cab. An employe at a gravel-washing plant fell against the belt conveyor; his neck was broken and his trunk crushed and he died from his injuries. The third fatality occurred when an employe, while cleaning a gravel bin, was covered by gravel and suffocated. Nonfatal injuries were due chiefly to handling objects, falls of persons, haulage equipment, falling objects, hand tools, and machinery. Individual accident reports covering 146 accidents revealed the fact that these six classes of accidents accounted for 78% of the total number of accidents from all causes.

In view of the fact that very little definite information is available regarding accidents at sand and gravel plants, a complete list (Table 3) is attached to this report covering all accidents for which individual reports were received.

It is hoped that all companies engaged in the production of sand and gravel will closely examine the information contained in Table 1 with a view to determining the position which their plants would have occupied if they had been enrolled in the safety contest of 1929. Companies desiring to participate in the 1930 safety competition are cordially invited to do so. Enrollment applications will be mailed upon request addressed to the Bureau of Mines. All producers of sand and gravel are eligible for enrollment.

The writer desires to express his appreciation to D. Harrington, Oliver Bowles, and J. R. Thoenen, of the Bureau of Mines, for comments and criticisms made in connection with the preparation of this paper.

TABLE 2—SCALE OF TIME LOSSES FOR WEIGHING INDUSTRIAL-ACCIDENT DISABILITIES SO AS TO SHOW SEVERITY OF ACCIDENTS

Nature of injury	Degree of disability in per cent. of permanent total disability	Days of disability
Death	100	6000
Permanent total disability	100	6000
Arm above elbow, dismemberment or permanent disability of	75	4500
Arm at or below elbow, dismemberment or permanent disability of	60	3600
Hand, dismemberment or permanent disability of	50	3000
Thumb, any permanent disability of	10	600
Any one finger, any permanent disability of	5	300
Two fingers, any permanent disability of	12½	750
Three fingers, any permanent disability of	20	1200
Four fingers, any permanent disability of	30	1800
Thumb and one finger, any permanent disability of	20	1200
Thumb and two fingers, any permanent disability of	25	1500
Thumb and three fingers, any permanent disability of	33⅓	2000
Thumb and four fingers, any permanent disability of	40	2400
Leg above knee, dismemberment or permanent disability of	75	4500
Leg at or below knee, dismemberment or permanent disability of	50	3000
Foot, dismemberment or permanent disability of	40	2400
Great toe or any two or more toes, any permanent disability of	5	300
One toe, other than great toe, any permanent disability of	0	.....
One eye, loss of sight	30	1800
Both eyes, loss of sight	100	6000
One ear, loss of hearing	10	600
Both ears, loss of hearing	50	3000

TABLE 3—LIST OF ACCIDENTS REPORTED BY SAND AND GRAVEL PLANTS IN 1929 PIT OPERATIONS

Cause	Date of accident	Place	Regular occupation	Occupation, when injured	Type of injury	Part of body
Tripping dump car. Lever caught hand	3- 8	Plant, on car	.....	Tripping dump car	.....	Hand
Piece of steel fell on foot	3-14	Mill	.....	Repairing chutes in mill	Fracture	Second toe, left foot
Plank with nails fell, hitting him on head	3-18	Plant	.....	Cleaning up around plant, struck on head by plank	Laceration	Head, scalp
Stepped on nail	3-29	Crusher dept.	Crusherman	Working in crusher department	Puncture	Left foot
Fall of timber and iron	4-16	Screen floor dept.	Mill helper	Tearing down old chute	Contusion	Right foot and left hip
Oiling machinery in mill; caught arm in pulley	4-15	Mill	Oiler	Oiling machinery in plant	Fracture	Right elbow
Pains in arm while shoveling gravel	5-16	Upper switch	Laborer	Shoveling gravel	Swelling	Right arm
Handling lumber	6-11	Plant	Laborer	Handling lumber, ran splinter in left wrist	Puncture	Left wrist
Bumped foot on step in stepping off railroad car	11-12	On railroad car	Switchman	Stepping off railroad car, bumped right foot against step	Contusion and pinched nerve	Right foot
	8- 8	.....	Pump operator	.....	Bruise	Right knee
Counterbalance fell on hand	6-26	Crane	Crane operator	Operating crane	Bruise	Left hand
Crank flew off flywheel	5-21	Plant	Pitman	Cranking gasoline engine, struck on nose	Cut	Nose
Hammer caught fingers	8- 6	Car	Cleaner	Cleaning car, door jammed and used hammer to pry door and caught fingers	Mashed fingers	Fingers
Short flash	8-27	At switch	Craneman	Throwing switch, causing short flash, burning eyes and face	Burns	Eyes and face
Turned ankle	8-20	Plant	Laborer	Helping shift freight cars	Sprain	Ankle
Caught feet in cable	5- 3	Around crane	Laborer	Working around crane	Bruised and skinned	Right foot and left leg
Board dropped from top of plant	2-21	Plant	Carpenter	Sawing lumber; wind blew board out of its course, and it fell on foot	.....	Left foot
Caught finger nail between pipes	4-26	Plant	Laborer	Laying 16-in. pipe line; man was steering pipe being lifted by clamshell	Mashed finger, loss of nail	Finger
Foreign body in eye	5- 1	Pit	Laborer	Firing shovel	Foreign body in eye	Eye
Fell on lump of coal	5- 1	Plant	Car patcher	Patching cars for loading gravel winding up hopper bottom car door	Strained ligaments	Hip
Car dumped prematurely, dumped where man was standing	6-10	(stripping)	Laborer	Washing stripping dirt away from dump with water; rear chain on car became unhooked while loading, causing car to jump	Fracture	Rib
Burned by throwing out switch while motor was running	8- 7	Plant	Crusher room man	Shutting down crushers; burned arm and hand	Burns	Right arm and hand
Caught finger between rolling barrel and rack	4- 9	Crusher room	Crusher room man	Rolling barrel of oil on rack	Bruise, mashed finger, loss of nail	Index finger left hand
Burned by acetylene hose on fire	8-10	Plant	Plant man	Dismantling gravel screen	Burns	Face and neck
Hit self with hammer, cut palm of hand on chute	8-23	Conveyor	Clean-up man (conveyor)	Repairing chute from hopper to conveyor	Cut	Left hand
Caught finger between roller and big trunnion wheel	8- 4	Gravel screen	Plant repairman	Repairing gravel screen	Mashed	Little finger, left hand
Dinkey could not be stopped at hopper, striking clam, caught his foot between bevel gears	8-15	Plant	Clamshell operator	Repairing clamshell	Cut	Left side of foot
Struck dipper cave in bank	9-27	Pit	Bank man	Caving gravel bank	Scratched and bruised	Right side and pelvic region
Carrying rail, dropped on foot	10- 4	Pit	Bank caver	Carrying rail	Bruise	Left foot
Fell from car	11-13	Plant	Car rider	Dropping loaded cars of gravel below plant	Bruise	Left elbow
Machinery falling off truck, overbalanced	1-14	Plant	Truck driver	Loading machinery on truck; load slipped off rear	Bruise	Right leg, cap and shin
Lost balance and fell	1-27	Sand-box	Laborer (doing carpenter work)	Working on top of sandbox, fell 12 ft. astride an iron rod	Bruise	Inner surface of thigh
Unexpected pull on hoist line, caught head	1-31	Scaffold	Laborer (mach. constr.)	Erecting new gravel distributors, pull on hoist line caught head between distributor and bottom of bin	Laceration	Nose and above left eye
Slippery, icy condition; fell from pontoon	2-22	Pontoon dock	Night watchman	Breaking ice, stepping from pontoon slipped and fell on ice	Wrench	Right knee joint
Lost balance and fell under 12-in. pipe being loaded on car	3-10	R.R. track	Laborer	Helping to load car of 12 in. pipe	Bruise	Right thigh
Carelessness; struck leg with pick	9- 4	Loading docks	Car loader	Trying to close bin gate under loading bin on the loading dock	Bruise	Calf of left leg
Chisel slipped and little finger was struck with sledge	8-13	Tipple	Laborer	Removing old segments from crusher	Bruise and laceration	Little finger
Skip car ran into man, knocking him down and dragging him	5- 8	Under hopper	.....	Loading cars under boot hopper	Laceration and fracture	Scalp, shoulder and ribs
Running hoist skinned shin on pipe	6-17	Hoist	Running hoist	Running skip hoist	Burns, swelling, skinned	Left shin
Sprained foot stepping off engine	6-19	Gravel pit	Riding cars	Riding cars, sprained foot in stepping off engine	Sprain	Left foot
Pinch bar slipped and threw man against coupling of car	6-19	Under ballast car	Riding out sand cars	Riding out sand cars	Bruise	Left shoulder, upper arm and first and second ribs separated
Steel sheet fell on big toe and crushed it	7-21	Plant	Repairman	Carrying steel sheets	Crushed big toe	Big toe, right foot
Sand box on drill press slipped and wrenched side of man supporting it	9- 7	Press on drill	Laborer	Supporting box on drill press	Wrench	Left side
Fell on sand, striking knee	9-13	Yards	Sweeping cars	Sweeping cars	Contusion	Knee
Almost fell off ladder	11- 9	Steam shovel	Shovel runner	Placing roofing on shovel, roofing began to slide, in holding roofing nearly fell off ladder	Sprain	Back and right chest muscles
Icy; slipped while climbing into hopper and fell	12-10	Storage, track for	Laborer (car patching)	Patching cars, fell into hopper	Bruise	Muscle on back of right leg
Stepped on nail	8- 2	Plant	Tearing down building	Tearing down old building	Puncture	Right foot
Hopper gate fell on arm	6-15	Plant (near)	Laborer	Repairing field hopper	Bruise	Arm
Cut hand on knife used to cut sacks	6-26	Plant	Laborer	Picking up sacks, cut hand on knife used to cut sacks	Cut	Hands
Stone fell on foot	9- 4	At plant	Laborer	Cleaning up about plant tracks, stone fell on foot	Mashed toes	Second and third toes, left foot

(Continued on following page)

TABLE 3 (Continued)—LIST OF ACCIDENTS REPORTED BY SAND AND GRAVEL PLANTS IN 1929

PIT OPERATIONS *(Continued)*

Cause	*Date of accident*	*Place*	*Regular occupation*	*Occupation, when injured*	*Type of injury*	*Part of body*
Block slipped between rail and jack, throwing man to tie	3-28	Plant	Laborer	Working on track	Bruise	Left hip
Struck by falling bar	4-17	Plant	Night foreman	Riding cars, struck on head by falling bar	Laceration	Head
Lifting plank	1-15	Plant	Asst. foreman	Lifting heavy plank	Sprain	Back, lungs
Bar glanced on board and struck foot	4-16	Track	Laborer	Dismantling flume	Bruise	Foot
Carrying gasoline can on shoulder	4- 7	Track	Track work	Carrying gasoline can, bruised shoulder	Bruise	Shoulder
Slipped and fell	2-13	Boat	Boat operator	Repairing hoist	Dislocation	Vertebra
Foot slipped on pipe, fell several feet	1- 7	Plant	.....	Building pipe line	Sprain	Ankle
Supporting timbers fell on foot	7-21	Plant	Foreman	Repairing crusher	Bruise	Foot
Hot steel flew in eye	3- 2	Plant	Screen work	Repairing plant screen work	Burn, hot steel in eye	Eye
Fell from loading-dock step in attempt to stop moving car	6-16	Loading docks	Car loader	Riding cars to load under tipple	Sprain	Left foot and ankle
Failure to remove finger from under shaft	5- 7	Dredge	Laborer	Moving impeller with shaft in place, dropped impeller shaft on end of finger	Mashed nail off	Left index finger
Started to jump on truck, foot slipped and left leg struck sharp corner of truck	7-10	Gravel pile	Stenographer	Climbing on truck	Cut	Left leg, above instep
Coupling up coal car, caught hand in coupling	2- 1	Car-loading platform	Car cleaner and loader	Coupling up cars	Bruise and laceration	Right hand

BANK OPERATIONS

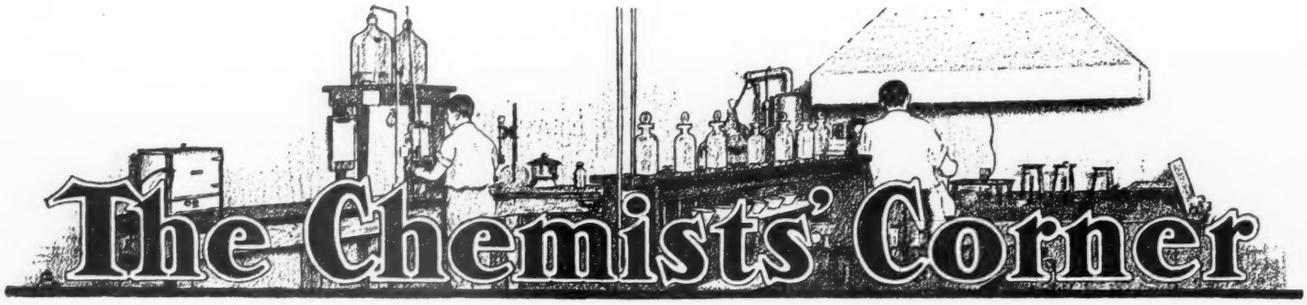
Setting brake on hopper car	8-31	Above gravel wash'g plant	Foreman	Riding hopper car	Strain	Back
Gravel bank caved in	11- 9	Gravel pit	.....	Working around steam shovel on ground	.....	Left leg
Caught finger between valve handle and nut	10- 3	Pit	Laborer	Water line	Torn nail	Third finger on right hand
Got a sliver in left hand and did not have it removed	6-11	.....	Laborer	.....	Puncture	Left hand
Crane swung around and caught man between frame and cab	7- 2	Near crane	.....	Leaning against frame of crane	Death	Crushed ribs and right side, internal injuries
Caught arm in feeder	8-19	.....	Millwright	.....	Sprain	Elbow
Finger nail torn off between two rocks	8-30	.....	Laborer	.....	Torn nail	Finger nail
Jumping from moving car to stationary car, slipped from icy rung and fell	11-20	Between tracks	Car loader	Loading cars	Strain	Left arm, ligament strain
Fell against belt conveyor	2-24	Gravel washing plant	Laborer	Producing gravel and sand	Death	Broken neck, crushed trunk, etc.
Sledge slipped off chisel and struck middle of forehead	4-22	On steam shovel in pit	Laborer	Cutting rivet	.....	Forehead
Slipped and struck right shoulder on railroad tie	7-31	Hopper	Laborer	Dumping side dump cars loaded with gravel	.....	Right shoulder
Slipped and fell against vice	8-28	Machine shop	.....	Lacing leather belt	.....	.....
Kicking piece of tin into car, tin went through shoe and cut big toe	6-29	Outside of plant	Laborer	Cleaning railroad cars	Cut and swelling	Big toe, left foot
Jack slipped from under track, caught fingers on left hand	7-15	On track	Laborer	Jacking up track on dump	Amputation	Three fingers on left hand
Lost hold on top of car and fell backwards off car	8-27	On car	Truck and car loader	Climbing on top of car	Break	Left arm
Gate fell, catching front finger on left hand between gate and frame	6-16	Hopper	Production of sand and gravel	Repairing gates in boots	Mashed end of finger	First finger on left hand
Cotter key sheered on switch lever when being thrown over and switch weight came over on toes of left foot	9- 4	Yard	Switchman	Operating switch	Crushed toe, loss of nail	Large toe of left foot
Light from electric welder flashed in eyes, causing pain and blindness for a time	10- 9	Plant	Laborer (repair work)	Helping electric welder	Burns, inflammation of eyes	Eyes, face burned
Handle of windlass struck arm	3-10	Plant	Laborer	Reconstructing plant, operating windlass	Bruise	Left arm
Pulled steel chute over live wire, causing fall against sharp edge of concrete wall	3-30	Runway to top of plant	Laborer	Pulling chutes up to plant	Cut	Head
Light from electric welder caused eyes to become inflamed and painful	4- 7	Railroad tracks	Laborer	Rebuilding plant, working on raising rails	Swollen eyes	Eyes
Bruised little finger shoveling	8-19	Under hopper	Laborer	Cleaning out sand and gravel under hopper, bruised finger shoveling	Bruise	Little finger right hand
Slipped on icy ground, strained side in trying to prevent fall	3- 6	At tunnel	Laborer	Carrying concrete forms, building forms for concrete	Strain	Left side
Large stones fell on hand when poking through hopper gate	9-14	Hopper	Laborer	Knocking rocks out of hopper gate, stone fell on hands	Bruise and torn skin	Hands
Working in bottom of tunnel, two stones fell, striking him above ear	2-17	Tunnel	Laborer	Building tunnel, fall of stone	Bruise and torn skin	Head and ear
Prying tie on railroad, another employe using spike maul struck him in center back along lower ribs	5-15	On track	Laborer	Building track, prying railroad ties	Fracture	Lower rib
Hit in side with clamshell bucket	8-21	At pit	Laborer	Helping make fill with gasoline shovel moving mats	Broken rib	Rib
Jumped from shovel to ground; hurt back	3- 1	Plant	Laborer	Loading from stockpile, helping put car on track	Strain	Back
Carrying ties, fell and struck chest on railroad spike	7-28	On track	Track foreman	Carrying ties on track, fell on spike	Bruise	Chest
Strained muscles in back lifting tank	11- 3	Plant	Dragline operator	Moving water tank, strained muscles in back	Strain	Back
Stepped on nail protruding from board	12-13	Tunnel	Carpenter	Building forms	Puncture	Left foot
Stepped on nail protruding from plank	2- 7	Tunnel	Laborer	Loading forms at tunnel and stepped on nail which ran in instep	Puncture	Foot
Mashed finger in placing one form upon another	2-18	Tunnel	Laborer	Placing concrete forms at tunnel, mashed end of finger	Mashed finger, loss of nail	Left hand

TABLE 3 (Continued)—LIST OF ACCIDENTS REPORTED BY SAND AND GRAVEL PLANTS IN 1929
BANK OPERATIONS *(Continued)*

Cause	*Date of accident*	*Place*	*Regular occupation*	*Occupation, when injured*	*Type of injury*	*Part of body*
Hit on foot by tie which fell from another man's hand	2- 4	Tunnel	Laborer	Unloading cross-ties on tunnel job	Mashed toe, loss of nail	Foot
Falling timber	1- 8	Tunnel	Laborer	Taking down forms, board fell catching thumb between falling board and form	Mashed thumb	Thumb
Joint of pipe fell on foot	9-28	Plant	.....	Testing gravel at plant	.....	Foot
Wrench slipped; fell, twisting ankle	10-25	Cars	Patching cars	Winding hopper in car, wrench slipped and fell back twisting ankle	Break	Ankle
Reflection of light from welding machine	9-30	Flumeway	Track foreman	Building flumeway, reflection of arc light from welding machine	Inflammation of eyes	Eyes
Short in switch	11-24	Plant	Plant man	Starting screens, short in switch caused spark to fly and burn hand	Burn	Left hand
Eyes burned by reflection of arc light	3-18	Chute	Plant man	Working near welder, reflection of arc burned eyes	Burn	Eyes
Back sprained moving pipe	10- 1	Plant	Laborer	Moving pipe with bar, sprained back	Sprain	Back
Kicked in chest when climbing in car	9-18	Yards	Caretaker (dead-engine)	Climbing on car, kicked in chest and fell bruising nerves in left side	Bruise	Nerves in left side
Piece of steel flew off chains on car and imbedded in eye	7-16	Stripping dump	Laborer	Striking dump chains on car with iron bar	Steel in eye	Right eye
Auto overturned in which man was riding	5-27	On highway	Carpenter	Driving car	Bruises, cuts and broken bone	Collar bone, head and body
Auto overturned in which man was riding	5-27	On highway	Carpenter	Driving car	Fractures, cuts and bruises	Shoulder, arm, elbow of left arm, also bruises on body
Auto overturned in which man was riding	5-27	On highway	Laborer	Driving car	Cuts and bruises	Cut under arm, bruises on arms and body
Pole fell on foot	5- 7	Stripping dump	Laborer	Using pole to dump car, pole fell on foot while foot was on tie	Bruise	Foot
Dinkey engine struck car under which man was working; struck by wheel on leg	4- 6	Pit	Laborer	Working under car	Bruise	Leg
Locomotive cab fell on legs	4- 5	Near shop	Laborer	Unloading locomotive cab from car. Fell across his legs	Bruise	Legs and ankle
Slipped and fell	1-30	Near stripping shovel	Laborer	Slipped and fell striking back on frozen earth	Bruise	Back and ribs
Skinned knuckle caused infection	1-15	On dinkey	Boiler maker	Cutting flues and skinned knuckle of finger on left hand	Infection	Middle finger of left hand
Rail rolled when dropped and struck foot	1-10	Pit	Laborer	Men carrying rails, one rolled when dropped and struck him across foot	Bruise	Left foot
Plank struck across right arm	1- 5	Loading conveyor	Laborer	Tearing down old conveyor, struck by plank	Fracture	Right arm above wrist
Piece of maul split off and struck arm	5- 5	Pit tracks	Laborer (track)	Driving spikes, piece of maul flew off, struck him on left arm	Puncture	Left arm
Finger caught between couplers of car	9- 6	On track	Laborer (track)	Finger caught between couplers of car	Mashed	Finger
Chain fell on foot	8-25	Plant	Laborer	.....	Fracture	Great toe of right foot
Particle in eye	7-22	Plant	Laborer	.....	Particle in eye	Eye
Struck in mouth by brake bar	5-28	Plant	Laborer	.....	Cut lip	Lip and teeth loose
Pick-up truck overturned	5-27	Highway	Laborer	Riding in truck which overturned	Sprain and bruise	Sprained ankle, bruised hip
Pick-up truck overturned	5-27	Highway	Laborer	Riding in truck which overturned	Bruise	Body and eyes
Fell 12 ft., screen to floor	5-15	Plant	Plant man	Working on top of gravel screen, fell 12 ft. to floor	Bruise	Back
Slipped and fell	5-14	Hopper	Laborer	Removing rocks from top of hopper	Bruise	Left arm near elbow
Pole broke and struck face	4-30	In car	Laborer	Pole used to dump car broke in two and struck across face and mouth	Struck in face and mouth	Face and mouth
Thrown against car	4-19	In car	Car rider	In car, thrown against side of car	Bruise	Hip
Struck in leg by rock	3-10	Plant	Laborer	Near bank, rock rolled from bank and struck leg	Bruise	Angle
Stepped on nail	2- 4	Plant	Steam engineer	Stepped on rusty nail in board	Puncture	Foot
In car struck by dinkey engine and four cars	4- 6	In pit	Laborer	Cleaning out car	Fractures, broken bones, cuts, and bruises	Collar bone, toe and femur
Hit right hand with sledge hammer	11-29	Hopper house	Hopper	Taking handle out of sledge hammer, hit right hand with hammer	Blood poison	Right wrist
Partner tightening nut, sledge hammer slipped out of his hand and struck him on head	12-20	Crusher room	Mechanic	Changing eccentric on crusher	Fracture	Skull
Tip of finger caught between return roller and conveyor belt	10-14	Second conveyor way	Laborer	Cleaning return rollers on second conveyor belt	Crushed finger, loss of first joint	Middle finger right hand
Pinched finger	.....	.....	.....	.....	Pinched	Finger
Turned ankle	.....	.....	.....	.....	Turned ankle	Ankle
Covered by gravel, causing suffocation	1-10	Bin (gravel)	Plant operator	Cleaning gravel bin	Death	.....
Became overheated working on hopper	6-17	Gravel hopper	Laborer	Dumping gravel cars	.....	.....
Coupling cars and, instead of catching hold of grab iron under body of car, grabbed bottom of car and side door came down on fingers	10-29	Stripping dump	Laborer	Coupling cars on stripping dump	.....	Fingers

RIVER PLANTS

Falling against pile at end of wharf	5-29	End of wharf	Dredge foreman	Putting down some skid timbers from end of wharf to barge preparatory to loading heavy machinery onto barge	Sprain	Left arm, hand and shoulder
Piece of timber fell on toe	7-16	At shipyard	Laborer	Taking some 3x10 decking off of new barge when a piece fell on toe	Mashed great toe; loss of nail	Great toe on left foot
Hit in eye by rock from gravel-cleaning machinery	8-26	Dredge	Gas engineer and screen operator	Looking after operation of classifier (gravel washing machinery) and vibrating machine and when passing by wheel of vibrating screen, rock fell over side of classifier into the wheel and was thrown out, hitting employe in left eye	Bruise	Left eye
Struck in right eye by piece of crushed gravel	7-23	On river	Laborer	In car near chute where gravel was running into car	Crushed gravel in eye	Right eye
Brush struck his eye	1-25	On river	Night watchman	Running through brush	Brush struck his eye	Eye
Trip on railroad dump car suddenly released and bar hit his thumb and broke middle joint bone	8-28	On river	Laborer; use hand brake on R.R. car	Releasing the trip on a railroad dump car	Fracture	Thumb
Stepped on nail	11- 4	On river	Laborer	Tearing off old deck of dredge boat, stepped on nail	Puncture by nail, infection	Foot
Tearing down waste water frames, stuck nail in arm	10-11	On river	Laborer	Tearing down old waste water frames, stuck nail in arm	Puncture by nail, infection	Arm

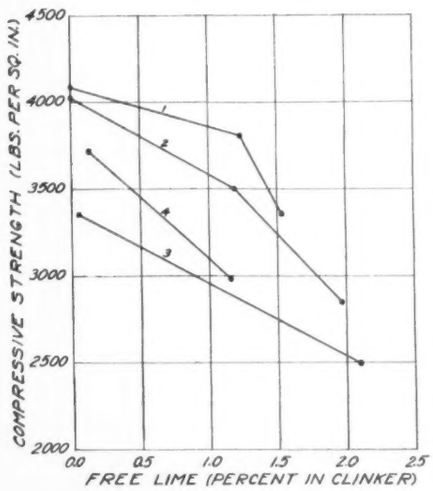


Effect of the Free Lime in Clinker Upon Its Strength-Producing Properties

By Harold H. Steinour and Hubert Woods
Riverside Cement Co., Riverside, Calif.

LERCH (1) has shown that residual free lime in amounts exceeding about 2% is responsible for the unsoundness in portland cement, as determined by the steam test. A cement that will pass this test is ordinarily considered sound. It may, however, contain free lime insufficient to cause failure in the test but still capable of producing strain. It is possible that this may appreciably lower the strength which might otherwise be produced.

Whether or not this is true there is a further and very important reason for suspecting that a cement which passes the steam test, but which contains 1% or 2% of lime which did not combine during clinkering will produce noticeably less strength than if combination had been complete. Bogue (2) has shown that each per cent of free lime if combined would produce 4.07% of tricalcium silicate. If, as is generally accepted in this country, the early strength of portland cement results from this silicate, a reduction in its amount equivalent to from 4% to 8% of the weight of cement should be significant. The experiments to be described were designed to test the truth of the foregoing considerations and to obtain data on the magnitude of the expected effect.

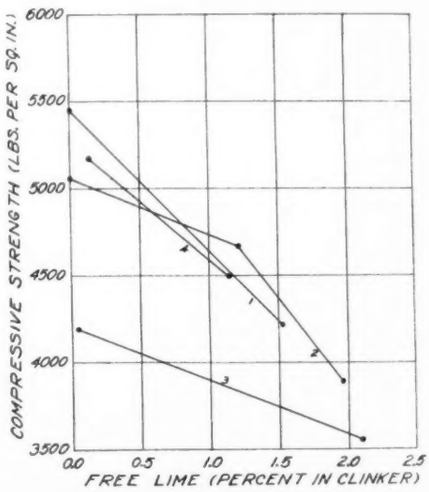


The effect of residual free lime in lowering 3-day compressive strength in 1:3 standard sand mortars. The lines connect cements of the same composition, numbered as in the table

Four different cement mixes were prepared and clinkered in a gas-fired laboratory furnace. These mixes were all calculated to produce clinker containing 64.5% CaO and 5.0% MgO, with SiO_2 varying from 20.5% to 21.5%, Al_2O_3 from 5% to 6% and Fe_2O_3 from 3% to 4%. The raw materials were plant kiln feed and small amounts of technical grades of oxides.

One portion of each composition was fired under conditions of time and temperature which reduced the free lime to a negligible amount. Other portions were fired under conditions which left 1% to 2% uncombined. This lime was determined by the ammonium acetate titration method (3, 4). The clinkers were analyzed and found to correspond approximately to their calculated compositions. Clinkers from a given mix were ground with the same percentage of gypsum, about 3.5% to 4.0% in all cases. Grinding was done in a laboratory jar mill under conditions which we have found give reliably uniform results. The product is finer than that obtained in normal mill practice and hence exhibits higher strength. Three-, 7- and 28-day compression tests were made on 1:3 standard sand mortars. All cements passed the steam test satisfactorily.

The following table presents the free lime and strength data, together with the calculated (2) amounts of tricalcium silicate in clinker:



The effect of residual free lime in lowering 7-day compressive strength in 1:3 standard sand mortars. The lines connect cements of the same composition, numbered as in the table. The isolated point is that obtained in experiment No. 2, which, in view of the preponderance of the other data, is obviously in error

RELATIONSHIP BETWEEN FREE LIME CONTENT AND COMPRESSIVE STRENGTH

Expt. No.	Composition No.	Free Lime in Clinker, %	Compressive Strength of Cement 1:3 Mortars, lb./sq. in. 3-day	7-day	28-day	Calculated $3\,CaO{\cdot}SiO_2$, %
1	1	0.00	4087	5451	6759	61
2	1	1.24	3810	5618	7006	56
3	1	1.53	3359	4217	6517	55
4	2	0.00	4031	5064	6540	60
5	2	1.19	3502	4670	6097	55
6	2	1.97	2845	3890	5701	52
7	3	0.05	3358	4193	5416	54
8	3	2.10	2498	3558	4990	46
9	4	0.13	3718	5176	6771	58
10	4	1.16	2985	4502	6335	54

It will be observed that, with the exception of the 7- and 28-day tests on the cement of experiment No. 2, for any given composition the samples with higher free lime exhibit lower strength. This represents agreement between 28 out of 30 tests. Perhaps a clearer conception of the magnitude of the effect will be obtained from the accompanying plots of 3- and 7-day strength versus free lime.

It is evident that the presence of 1 or 2% of free lime in clinker means a very real lowering of the strength obtainable from the cement even though it passes the steam test satisfactorily. It seems reasonable to attribute a large proportion of this effect to the decreased tricalcium silicate content. This indicates that weathering of unsound clinker in order to carbonate the uncombined lime, while it may render the product sound, cannot give it the strength-producing qualities it would have possessed had it been better burned.

References

(1) Lerch, *Cement Mill Edition of Concrete*, **35-1**, 109-112, and **35-2**, 115-118 (1929).
(2) Bogue, *Ind. Eng. Chem., Anal. Ed.*, **1**, 192-197 (1929).
(3) Lerch and Bogue, *Ind. Eng. Chem.* **18**, 739-743 (1926).
(4) Steinour and Woods, *Rock Products*, **32-4**, 74 (1929).

Water-Borne Concrete Aggregates Becoming Important Factors on Great Lakes

THE *Detroit* (Mich.) *News* reports that the Lakeports Supply Co. has reduced the price of crushed stone, sand and other concrete aggregates to a new low level. "The Lakeports Supply Co. is the largest retail distributor of commercial crushed stone in this section of the country, controlling the entire output of various crushed stone interest on the Great Lakes with a disposal of approximately 4,000,000 tons of material per year. With quarries located at strategic points on the Great Lakes and handling nearly all of its output by water transportation, the company is enabled to supply its materials to various municipalities, public utilities and individual contractors at a low margin of profit. 'Huge self unloader boats that operate most economically through two-way transportation, together with control of source of supply, have enabled the Lakeports company to reduce freight rates to a minimum and to prevent undue fluctuation in prices,' according to E. L. Jones, Detroit district manager of the company.

"Our volume operations have enabled us to pass price reductions along to our patrons in the hope that paving and building programs will go along with dispatch, thus giving employment to labor and at the same time effecting decided savings. I look for considerable improvement in the building and paving industries this summer," Mr. Jones added.

In addition to supplying its materials to municipalities and public utilities the Lakeports company furnishes concrete aggregates for many large private building operations; recent contracts include the new Union Trust building, the Detroit Union Produce Terminal, the new Shaefer office building at Dearborn, the Great Lakes Steel plant and numerous other large structures.

Steel Corporation Increased Capital in Quarry Property

ACCORDING to the annual report of the United States Steel Corp. $1,729,844 was added to capital expenditures in 1929 for improvements and extensions of its limestone properties. The expenditures for the year include outlays for general additions and improvements to limestone plants, equipment and facilities located in the Pennsylvania and Ohio districts; rather extensive additions and betterments to the Calcite, Mich., plant of Michigan Limestone and Chemical Co., including new crushing and screening station, new power station and extension of harbor breakwater; also the opening and equipping of two new limestone operations by Tennessee Coal, Iron and R. R. Co. in Alabama.

Swanscombe (England) Cement Mill Modernized

THE Swanscombe Works of the Associated Portland Cement Manufacturers, Ltd. (England), is one of the oldest cement mills in that country, having been established about 100 years ago. At several periods it has been altered and improved in keeping with the trend of times. Until quite recently there were 16 kilns 160 ft. long, producing about 2,000,000 bbl. of cement annually, but about a year ago these were scrapped and replaced by three F. L. Smidth rotary kilns, 403 ft. long and 11 ft. 3 in. by 9 ft. 4 in. in dia. Each kiln has a capacity of about 90 bbl. per hour.

Incidental with the kiln changes, many other improvements were made, notably the installation of two new 30 ft. dia. wash mills and auxiliary equipment, a modern coal grinding equipment, new grinding mills and a packing plant. The total connected load is about 5000 kw., all power being purchased at 33,000-v. and stepped down to 3000- and 500-v.—*Cement and Cement Manufacture* (England).

Montana's New Limestone Industry

PLANS for installing a calcite plant with modern equipment, with a capacity of five carloads daily, are being carried out by the Calcite Mining and Products Co. at Springdale, near Hunters Hot Springs, Mont., on the Northern Pacific Ry. The new Montana industry is being launched under auspicious circumstances with a market for the entire product already established on the Pacific coast.

The calcite deposit is found north of Springdale station towards Hunters' Hot Springs. The plant is being placed at the mine and the finished product will be hauled by truck to the Northern Pacific trains at Springdale.

A small plant was built at the mine last year and a number of carloads shipped to the coast, sufficient to establish a demand. The entire possible production of the new plant is contracted for already. The principal market will be the poultry farms and orchards of the northern Pacific coast but quite a little of the product will be sold locally in Montana.—*Billings* (Mont.) *Gazette.*

Aggregates for Resurfacing Pavements

IT HAS been found necessary to resurface certain concrete highways in Connecticut, deterioration being due to poor subgrade conditions, improper drainage, too wet a mix when the concrete was laid, too small a depth and increase of traffic. According to a paper delivered at the Annual Asphalt Paving Conference, 1929, by W. H. Sharp of the Connecticut Highway Department, the last three causes are responsible for most of the deterioration. The department tries to resurface such pavements before they are so cracked as to be unstable.

Surfaces of both the semi-rigid and the flexible types have been tried, the choice depending on the condition of the pavement. The depth varies according to surfaces, the standing semi-rigid depth being 1½-in. and the flexible depth 2½-in. The cost at 20 miles distance from the mixing plant is about $1 for the semi-rigid type and 90 c. for the flexible type per square yard.

Mixes which have been recently tried are given in the paper as follows:

BINDER

4.8%	Bituminous contents
32 %	¾-in. stone
56 %	½-in. stone
7.2%	Screenings

ASPHALT CONCRETE TOP

7.5%	Bituminous contents
61.5%	½-in. stone
25.0%	¼-in. stone to dust
6.0%	Limestone filler

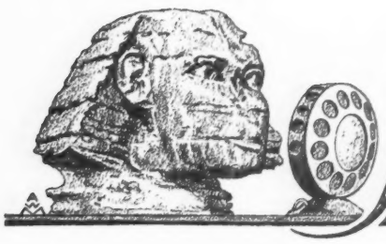
SHEET ASPHALT WITH TRAP ROCK SCREENINGS

11.0%	Bituminous contents
63.5%	Trap rock screenings
5.5%	Limestone filler

SHEET ASPHALT USING SAND

11.5%	Bituminous contents
77.5%	Various grades of sand as used in sheet asphalt
11.0%	Limestone filler

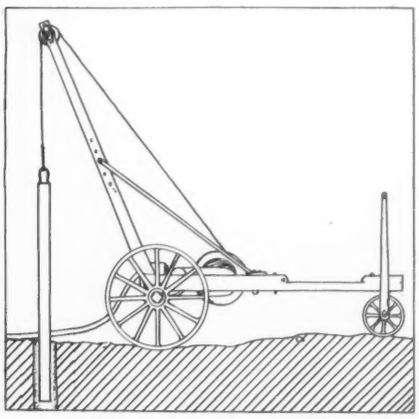
Amiesite and other standard surfacings have been used extensively. The paper reports that none of the work has been under traffic a sufficient length of time to determine which type is best suited for given conditions.



Hints and Helps for Superintendents

Portable Bailer for Cleaning Out Well Drill Holes

INITIAL blasts at the Northampton, Penn., quarry of the Universal-Atlas Cement Co. are made with 60% gelatine in the bottom of the holes and 40% ammonia powder for the upper charges. The holes are about 44 ft. deep and in order to make certain that the holes are dry and to be sure that the powder could sink to the bottom, the holes are bailed dry by a portable bailer, as illustrated above. This bailer is a light three-wheeled truck on which there is mounted a sand pump operated by a small air hoist.



Portable bailer used for bailing water from well drill holes

Expediting Gravel Operations

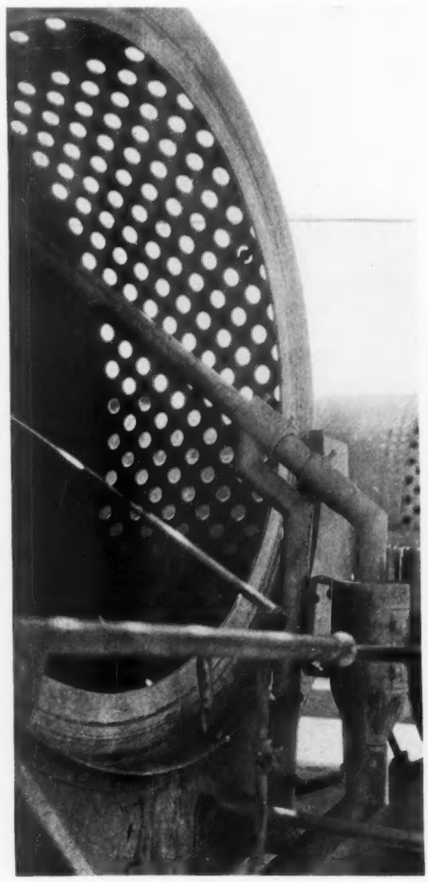
THE ROSS Island Sand and Gravel Co., Portland, Ore., uses a movable Hum-mer screen, suspending it wherever expedient over the bins to produce small lots of odd-sized gravel. There is also a portable electric welding apparatus for installing new screen sections on the rotary screens. Instead of having to loosen a lot of nuts and bolts, the practice is to simply burn off the old welded joints, place the new sections in the proper position, and spot weld them to the frame. By the use of these two ideas operations and repairs are simplified.

Unique Sand Dryer

SILICA sand is usually shipped in a dry state, hence producers have the problem of economical drying for the sand is generally classified wet. There are a number of different styles of dryers used at these plants, practically all employing methods by which the wet sand passes over heated steam coils. One operation uses a screened cage in which steam pipes are installed The sand is dumped into the cage and as it dries it sifts through the openings of the wire cloth sides. At this particular plant, the dryer has been found to work quite satisfactorily.

Clinker Sampler

THE accompanying illustration of a clinker sampler was taken at the Merced, Calif., plant of the Yosemite Portland Cement Co. It consists of a tube so mounted that when the cooler rotates, the lifter angles which are a part of the cooler mechanism pick up a small amount of the clinker and drop it into the end of the tube. The clinker in the tube then falls by gravity to a suitable receptacle.



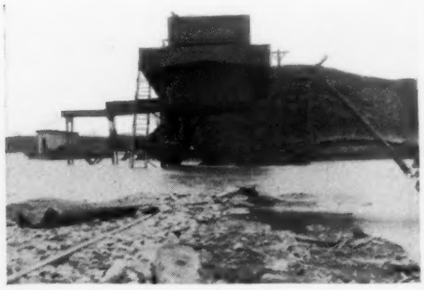
Clinker sampler in use at California cement plant

Dredge Field Hoppers

TRANSPORTATION of sand and gravel by pumping is economical for short distances when used in connection with dredging operations, but when transported by this method for a mile or more the operation loses its efficiency. Long distance pumping of sand and gravel requires booster pumps, and repairs and replacements to a pipe line of any length is a second expense not to be overlooked.

At the Welch avenue plant of the American Aggregates Corp., Columbus, Ohio, dredging ground near the plant has been worked out so that at the present time sand and gravel is secured from the Scioto river at a point three-quarters to one mile from the plant.

The management considered this distance too great to pump, so field hoppers were constructed and the dredge pipe lines discharged to these. The sand and gravel in the field hoppers is drawn by gravity into gondolas and hauled to the plant. The field hopper has many advantages that at first might not be apparent, among which might be mentioned that any sand, gravel or oversize that is not wanted can be left in the field sufficiently far from the plant as not to be a nuisance, as grizzlies can be installed at the top of the field hoppers and make a preliminary separation if desired.

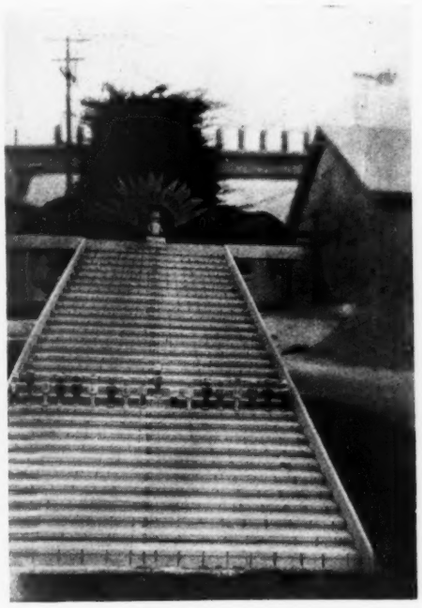


Field hoppers used in connection with dredging operations of the American Aggregates Corp.

A Novel Safety Campaign

THE SAFETY organization of the Santa Cruz Portland Cement Co., Davenport, Calif., is divided into department groups, each group in contest with one another as to which can make a more creditable showing. To keep this spirit alive a rather unique idea has been put into execution, the device

resembling a pair of stairs, each step in the stairs representing one day of the month and accordingly labeled. The 18 departments are represented by wooden dolls or dummies, each painted and decorated according to the artistic abilities and ideas of that particular department. The laboratory, for instance, is a rather tall owl-eyed individual



Unique idea for safety contest

with a studious expression. Other department representatives are also quite appropriate.

If a department goes one day without a lost-time accident the dummy is advanced one step towards the perfect month goal. Any department that lags behind is prodded to greater effort by his satanic majesty, who is immediately behind the erring department goading him on to better efforts with a red hot spear.

Preventing Stuck Kettles

IN DESIGNING a gypsum calcining plant it is well for the engineer to remember that the question of uniform electric power delivery to the plant is of importance, and if the logs of the power company supplying the current show many or excessive periods of no power, then the engineer had better figure on a more reliable means of driving his plant.

When filling a kettle with gypsum, the operation must be continued to the end of the cycle, and if the power goes off, some means must be provided to keep the kettle rabble mechanism and the fire under the kettle going. If this is not done, a stuck kettle is the result, which, as all plaster mill superintendents know, is a highly undesirable event. The other alternative is to dump the partly calcined gypsum into the hot pits, from which it must be removed and kept apart from the calcined plaster. Unless thought has been given this point during the design of the plant, removing partly calcined stucco from the hot pits is a second highly undesirable event.

At one western plant where the quarry is immediately alongside the mill, kettles are kept going during periods when power is off by commandeering the quarry crew to keep the rabble mechanism moving by manual means.

The designers of another mill planned its construction so that when the power went off the kettle was dumped to the hot pit at once. At the top of the elevator serving the stucco bins, a by-pass has been constructed which when functioning returns the partly calcined stucco to the kettle feed bin; when power is again available this material is returned to the kettles and re-calcined. By scraping down the sides of the hot pits and later flushing out the conveyor and elevator systems with a "wash" of good stucco, there has been no trouble with the quality of the plaster.

It was found that re-calcining partly cooked gypsum did not present any serious problem or require any change in the regular method of calcining—simply continuing calcining until the plaster was at the desired temperature, which is the regular practice.

Welded Piping Withstands Flames

RECENTLY in southern California lightning struck a 55,000-bbl. oil storage tank. The resulting fire was communicated to 13 other 55,000-bbl. tanks, and in addition six 1,000,000-bbl. underground reservoirs for crude oil had been destroyed with their contents. The entire area was utterly wrecked, and a total loss.

A close study of the wreckage was made by engineers representing oil companies, tank builders, pipe and pipe fitting companies, and others. A number of very significant facts were brought to light.

It was found that screw-coupled piping, even when buried underground, failed under the intense heat. Screwed joints pulled out of the fittings and couplings, other couplings and fittings warped or split, allowing the joints to separate. Many fittings collapsed entirely.

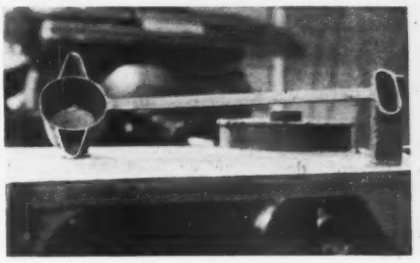
In joints made by oxwelding, however, there was no failure whatever. The accompanying cut shows the remains of the pipe connections to a booster pump. Note that all the fitting connections failed, the cast iron ell in the foreground having completely collapsed, yet all the welds in steel pipe remain intact.—*Oxy-Acetylene Tips.*

Welds in steel pipe remain intact after blaze

Handy Babbitt Ladle

THE welded babbitt ladle shown in the accompanying illustration was found very useful in pouring new bearings in a machine shop.

It has a long handle and two lips with



Babbitt ladle for pouring new bearings

a bottom feed so that the molten metal poured is free from slag. The lips were made up from ⅛-in. steel, heated by the blowpipe flame and forged into shape. The body was made by shaping a cylinder from ⅛-in. steel. Two holes for the bottom pour were cut out by means of the oxy-acetylene cutting blowpipe. A bottom plate similarly cut out was oxwelded in position. The lips were then welded on as shown. The handle, heated and forged from ¼-in. steel, also was welded on the body.

Trade Practice Rules of the Crushed Stone Industry Accepted by Federal Trade Commission

A REPORT of the trade practice conference of the crushed-stone industry, January 23, 1930, at Cincinnati, Ohio, was published in ROCK PRODUCTS, February 1, p. 109, as a part of the report of the annual convention of the National Crushed Stone Association, which preceded the conference. Twelve rules were adopted by the conference and were included in that report, although the original draft of the industry's committee included 15 rules (ROCK PRODUCTS, August 3, 1929). Under date of April 15 the Federal Trade Commission issued its formal report of the conference with 13 rules as accepted and classified:

Group I

RULE 1—The willful interference by any person, firm, corporation or association, with any existing contract between a seller and a purchaser, in or about the production, manufacture, transportation, purchase or sale of any product handled by the industry, or the performance of any contractual duty or service connected therewith, such interference being for the purpose or with the effect of dissipating, destroying or appropriating, in whole or in part, the patronage, property or business of another engaged in such industry, is an unfair trade practice.

RULE 2—The false marking or branding of products of the industry with the effect of misleading or deceiving purchasers with respect to the quantity, quality, size, grade or substance of the materials purchased, is an unfair trade practice.

RULE 3—The sale or offering for sale of any product of the industry accompanied by misrepresentations calculated to deceive customers or prospective customers as to the quantity, quality, size, grade or substance of such product, is an unfair trade practice.

RULE 4—The secret prepayment of transportation charges and/or the secret payment or allowance of rebates, refunds, credits or unearned discounts, whether in the form of money or otherwise, or secretly extending to certain purchasers special service or privileges not extended to all purchasers under like terms and conditions, with the intent and with the effect of injuring a competitor and where the effect may be to substantially lessen competition or tend to create a monopoly or to unreasonably restrain trade, is an unfair trade practice.

RULE 5—Any discrimination in price between purchasers of the same class, not including discrimination in price on account of the difference in grade, quality or quantity of the product sold, or which makes only due allowance for difference in cost of selling and transportation, or discrimination in price in the same or different communities made in good faith to meet competition, where the effect of such discrimination may be to substantially lessen competition or tend to create a monopoly, is an unfair trade practice.

RULE 6 (formerly Resolution 7)—The defamation of a competitor by words or acts imputing to him dishonorable conduct, inability to perform contracts or questionable credit standing, or the false disparagement of the grade or quality of his materials, is an unfair trade practice.

RULE 7 (formerly Resolution 8)—The selling of goods below cost with the intent and with the effect of injuring a competitor and where the effect may be to substantially lessen competition or tend to create a monopoly or to unreasonably restrain trade, is an unfair trade practice.

RULE 8 (formerly Resolution 9)—The secret paying, or promising to pay, to an employe of a customer or prospective customer, without the knowledge of his employer, of a commission or consideration of any character for the purpose of inducing or compensating for a sale, is an unfair trade practice.

RULE 9 (formerly Resolution 14)—The enticement of employes from a competitor for the purpose of interfering with his business, is an unfair trade practice.

Otho M. Graves, chairman of the Trade Practice Committee of the Crushed Stone Industry

Group II

RULE A (formerly Resolution 10)—The offering or giving of commissions, prizes, premiums, gifts or excessive entertainment to any one in connection with the sale, purchase or use of any product distributed by manufacturers within this industry, or as an inducement thereto, is condemned by the industry.

RULE B (substitute for former Resolution 6)—The practice of making sales on an f.o.b. factory basis on all shipments except within local delivery limits enables the purchaser to know the cost of the product, exclusive of freight charges, and is a commendable custom and recommended by the industry.

RULE C (formerly Resolution 15)—The industry hereby records its approval of the practice of each individual independently publishing his prices and terms of sale to the purchasing trade. The publication of fictitious prices and terms of sale by a manufacturer for the purpose of misleading the trade and the public is condemned by the industry.

RULE D (formerly (Resolution 13)—The crushed stone industry hereby authorizes the National Crushed Stone Association to take such steps as may be necessary to appoint a committee on trade practices to investigate whether these resolutions are being observed, to make complaints concerning alleged violations, co-operate with the Federal Trade Commission and generally to perform such other acts as may be reasonably necessary and proper to put these resolutions into effect and to accomplish the objects and purposes of this conference.

Meaning of Group I and Group II

The Federal Trade Commission in its formal statement says: "The rules as here announced become the rules of business conduct for the industry on the subjects covered. Those appearing in Group I are regarded by the commission as condemning unfair methods of competition in violation of the law, and are affirmatively approved. Those appearing in Group II are received as expressions of the trade."

In other words, any violation of Group I rules is a violation of some existing law. Group II rules are merely recommended practice. The crushed-stone industry is fortunate, however, in being one of few industries to succeed in getting an approval of the publication (individually) of prices and terms of sale, for the previous rulings of the commission on this point have been not entirely consistent, to say the least. All producers who do issue such price lists—who are not already making quotations for publication in ROCK PRODUCTS—are invited to make use of our columns to spread their quotations, or sales lists, before the industry.

Personnel of Committee

The personnel of the trade practices committee of the National Crushed Stone Association which drafted the code comprised: Otho M. Graves, past-president of the association, vice-president and general manager of the General Crushed Stone Co., Easton, Penn., chairman; Howard E. Bair, vice-president, France Stone Co., Toledo, Ohio; H. E. Rodes, president, Franklin Limestone Co., Nashville, Tenn.; T. I. Weston, president, Weston and Brooker Co., Columbia, S. C.; E. J. Krause, president, Columbia Quarry Co., St. Louis, Mo.; O. P. Chamberlain, president, Dolese and Shepard Co., Chicago, Ill., and W. L. Sporborg, General Crushed Stone Co., Syracuse, N. Y.

Editorial Comment

What Makes a Leader?

Dr. Donald A. Laird, director of Colgate Psychological Laboratory, in collaboration with others, has made a scientific investigation of "What makes a leader"?—in business and industry. Nearly all of us desire to be leaders, but how? The investigators studied published interviews and autobiographical writings and from these developed a questionnaire which was answered by outstanding business and industrial executives. The conclusions are summed up in the following paragraph:

"The outstanding general traits which emerge as characteristic of men showing strong qualities of executive leadership are: The ability to impress others as having self-confidence; skill in planning and organizing routine and directing subordinates; general business judgment; aggressiveness; foresight in anticipating future developments and thinking out details of future work in a constructive way; knowledge of details of the present job; skill in placing and developing subordinates; success in stimulating the interest of associates in their work; willingness to take over responsibility, and ability to carry it; and speed and soundness in reaching new decisions."

Obviously to be a leader one must have opportunity to develop or demonstrate the qualities which make for leadership. These come in many ways and under various guises. They come oftener, perhaps, to men in sales work than in the operating end of an industry, because selling a product, in the last analysis, is more vital to the continuance of a business than producing it.

But opportunities do come to men in the operating departments. And our present attitude toward safety and accident prevention is responsible for making many new opportunities. Just re-read the paragraph quoted above and note how admirably interest and activity in organized safety work in plant and industry provides a medium for self-expression, an opportunity to develop and the means to test the ability of men for leadership.

Add the following, which are the qualities named above in more specific terms: The ability wisely to delegate authority. The ability accurately to size up another's capabilities. The ability to "sell" workers and associates on the importance of their jobs. Power to keep a group working toward a common goal. Ability to praise good work without flattering. Ability to criticize constructively without antagonizing. Recognition of the wisdom of having reasons for orders understood. Ability to keep firm hold of difficult situations without becoming unreasonable. Ability to make people feel at ease when dealing with them. Consistency in dealings with others. A high sense of right and wrong without "preachiness." Lack of obstinacy in non-essentials. Obvious enjoyment of the possession of authority.

"Most men need leadership," says Samuel Vauclain, "yet true leaders are hard to find." They are hard to find because opportunities do not come to all men to prove or disprove their capacity for leadership. Foremen and superintendents should welcome organized safety work in their plants, if they are ambitious, because it offers a glorious opportunity. "Enjoyment of the possession of authority" is really the joy of leadership, and is often ample compensation in itself.

Our Future Highway Revenue?

Are we sitting secure in the belief that cement, stone, gravel, etc., are so fundamental that even revolutionary industrial changes will not affect us? We admit changes in the styles of women's clothes and shoes have nearly bankrupted whole industries. We know that the radio and automobile have ruined the piano industry, etc., etc. Can we conceive of any change that will affect the demand for cement and mineral aggregates? Sheet-steel highway surfacing has been proposed, but we dismiss it as the visionary propaganda of a steel enthusiast.

But sometimes we do not have to depend on change in the industry we are immediately interested in to affect our business very seriously. For example, what will the general adoption of Diesel engines for motor trucks and pleasure cars do to one of our principal sources of income for roadbuilding? About a half a billion dollars a year is now raised from the gasoline sales tax. Leland K. Fishback, gasoline tax collector for Indiana, has very pointedly raised the question, following the publicity recently given a Diesel engine motored automobile which made the trip of 792 miles from Indianapolis to New York on $1.38 worth of fuel.

Of course, we immediately say "tax the fuel oil"—but to get the same revenue from the fuel oil that would have been obtained from the amount of gasoline consumed (under the Indiana tax) would have required a tax of $2.64 on $1.38 worth of oil. That is unthinkable. So, is a great and acknowledged increase in the efficiency of internal combustion engines going to raise a serious problem in financing highway improvement? Who can say? But we must be forehanded and at least visualize the prospect—as far in advance as possible.

Diesel-engine powered motor trucks are already on the roads in Great Britain. Mr. Fishback says there are some in Indiana. We all know that the Diesel engine is such a vast improvement in efficient use of liquid fuel that it is only a question of time before it is developed to the point of practical use in automobiles. Perhaps, great property interests in the gasoline refining industry are trying to retard its development and general use, but even these can not prevent its ultimate perfection and use. What then?

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[39]	4-21-30	95	99	
Alpha P. C. new com.	4-21-30	35½	35⅞	75c qu. Apr. 15
Alpha P. C. pfd.	4-21-30	110	.....	1.75 qu. Mar. 15
American Aggregates com.[39]	4-21-30	20	25	75c qu. Mar. 1
Amer. Aggregates 6's, bonds	4-23-30	85	89	
American Brick Co., sand-lime brick	4-22-30	.....	5	25c qu. Feb. 1
American Brick Co. pfd., sand-lime brick	12-13-29	.....	80	50c qu. Feb. 1
Am. L. & S. 1st 7's[39]†	4-21-30	96	98	
American Silica Corp. 6½'s[49]	4-22-30	No market		
Arundel Corp. new com.	4-21-30	45⅛	45⅝	75c qu. Apr. 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[39]	4-22-30	No market		
Beaver P. C. 1st 7's[39]	1-10-30	.....	100	
Bessemer L. & C. Class A[4]	4-21-30	32	32½	75c qu. May 1
Bessemer L. & C. 1st 6½'s[4]	4-21-30	.....	91	
Bloomington Limestone 6's[39]	4-21-30	83	86	
Boston S. & G. new com.[47]	4-21-30	16	20	40c qu. Apr. 1
Boston S. G. new 7% pfd.[47]	4-21-30	46	50	87½c qu. Apr. 1
California Art Tile A	4-17-30	9	10	43¾c qu. Mar. 31
California Art Tile B	4-17-30	.....	5½	20c qu. Mar. 31
Calaveras Cement 7% pfd.	4-17-30	86¼	89	1.75 qu. Apr. 15
Calaveras Cement com.	4-17-30	12	15¾	
Canada Cem. com.	4-22-30	18	.....	
Canada Cement pfd.	4-22-30	.....	98	1.62½ qu. Mar. 31
Canada Cem. 5½'s[49]	4-22-30	99½	100	
Canada Cr. St. Corp. bonds[49]	4-22-30	95¼	.....	
Certainteed Prod. com.	4-21-30	10¼	10½	
Certainteed Prod. pfd.	4-21-30	26	30	1.75 qu. Jan. 1
Cleveland Quarries	4-22-30	65	67	75c qu. 25c ex Mar.1
Columbia S. & G. pfd.	4-21-30	95	100	
Consol. Cement 1st 6½'s, A	4-22-30	85	90	
Consol. Cement 6½% notes[39]	4-21-30	60	65	
Consol. Cement. pfd.[39]	4-21-30	50	60	
Consol. Oka S. & G. 6½'s[12] (Canada)	4-22-30	100	101	
Consol. Rock Prod. com.[9]	4-18-30	2½	5	
Consol. Rock Prod. pfd.[44]	4- 3-30	9	11	
Consol. Rock Prod. units	4-21-30	22	25	
Consol. S. & G. com. (Can.)[39]	2- 8-30	No market		
Consol. S. & G. pfd. (Can.)	4-22-30	82	85	1.75 qu. Feb. 15
Construction Mat. com.	4-21-30	23	23½	
Construction Mat. pfd.	4-21-30	45	45¾	87½c qu. May 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	4-19-30	94	98½	
Coosa P. C. 1st 6's[39]	4-21-30	50	55	
Coplay Cem. Mfg. 1st 6's[40]	4-21-30	90	.....	
Coplay Cem. Mfg. com.[40]	4-21-30	10	.....	
Coplay Cem. Mfg. pfd.[40]	4-21-30	70	.....	
Dewey P. C. 6's (1942)	4-22-30	98	.....	
Dewey P. C. 6's (1930)	4-22-30	98	.....	
Dewey P. C. 6's (1931-41)	4-22-30	98	.....	
Dolese & Shepard	4-21-30	81	85	$2 qu. Apr. 1
Edison P. C. com.[39]	4-21-30	10c	.....	
Edison P. C. pfd.[39]	4-21-30	25c	.....	
Giant P. C. com.[3]	4- 5-30	8	15	
Giant P. C. pfd.[3]	4-21-30	25	35	
Gyp. Lime & Alabastine Ltd.	4-22-30	24¼	24¾	37½c qu. Apr. 1
Hermitage Cement com.[11]	4-21-30	20	25	
Hermitage Cement pfd.[11]	4-21-30	80	90	
Hermitage Cement 6's[11]	3- 8-30	101	104	
Ideal Cement, new com.	4-21-30	54	57	75c qu. Apr. 1
Ideal Cement 5's, 1943[33]	4-21-30	97	100	
Indiana Limestone com.[39]	4-21-30	3	5	
Indiana Limestone pfd.[39]	4- 7-30	No market		1¾% qu. Mar. 1
Indiana Limestone 6's	4-21-30	82	84¼	
International Cem. com.	4-21-30	70	71	$1 qu. Mar. 28
International Cem. bonds 5's	4-21-30	102	102½	Semi-ann. int.
Iron City S. & G. bonds 6's	4-21-30	95	.....	
Kellev Is. L. & T. new st'k.	4-22-30	40	44½	62½c qu. Apr. 1
Ky. Cons. St. com. V. T. C.[48]	4-17-30	9	11	
Ky. Cons. Stone 6½'s[48]	4-17-30	94	98	
Ky. Cons. Stone pfd.[48]	4-17-30	87½	90	1.75 qu. May 1
Ky. Cons. Stone com.[48]	4-17-30	9	11	
Ky. Rock Asphalt com.[11]	4-21-30	15	17	40c qu. Apr. 1
Ky. Rock Asphalt pfd.[11]	4-21-30	80	85	1.75 qu. Mar. 1
Ky. Rock Asphalt 6½'s[11]	4-21-30	90	100	
Lawrence P. C.	4-21-30	62	67	$1qu. Mar. 29
Lawrence P. C. 5½'s, 1942	4- 2-30	83	.....	
Lehigh P. C.	4-21-30	39½	40	62½c qu. May 1
Lehigh P. C. pfd.	4-21-30	108	108½	1¾% qu. Apr. 1
Louisville Cement[48]	4-21-30	250	.....	
Lyman-Richey 1st 6's, 1932[13]	4-21-30	97	99	
Lyman-Richey 1st 6's, 1935[13]	4-21-30	97	99	
Marblehead Lime 6's[14]	4-18-30	94	98	
Marbelite Corp. com.	4-16-30	310	.....	
Marbelite Corp. pfd.	4-16-30	32	.....	50c qu. Apr. 10
Material Service Corp.	4-21-30	22	23	50c qu. Mar. 1
Medusa Portland Cem.	4-22-30	100	100½	1.50 Apr. 1
Mich. L. & C. com.[6]	4-19-30	17	.....	
Missouri P. C.	4-21-30	33¾	34	50c qu. May 1
Monolith Portland Midwest[9]	4-18-30	3½	4½	
Monolith bonds, 6's[9]	4-18-30	85	88	
Monolith P. C. com.[9]	4-18-30	6	7	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	4-17-30	5	7	40c s.-a. Jan. 1
Monolith P. C. units[9]	4- 3-30	21	24	
National Cem. (Can.) 1st 7's[29]	4-21-30	95	100	
National Gypsum A com.	4-21-30	7	8	
National Gypsum pfd.	4-21-30	35	40	
Nazareth Cem. com.[26]	4-21-30	24	27	
Nazareth Cem. pfd.[26]	4-21-30	98	.....	
Newaygo P. C. 1st 6½'s[39]	4-21-30	101½	102½	
New Eng. Lime 1st 6's[14]	4-18-30	90	95	
N. Y. Trap Rock 1st 6's	4-21-30	99½	.....	
N. Y. Trap Rock 7% pfd.[36]	4- 4-30	95	.....	1.75 qu. Apr. 1
North Amer. Cem. 1st 6½'s	4-21-30	65¼	.....	
North Amer. Cem. com.[29]	4-21-30	2	4	
North Amer. Cem. 7% pfd.[29]	4-21-30	20	24	
North Amer. Cem. units[29]	4-21-30	22	25	
North Shore Mat. 1st 5's[15]	4-22-30	98	.....	
Northwestern States P. C.[37]	3- 8-30	130	.....	$2 Apr. 1
Ohio River Sand com.	4-21-30	.....	18	
Ohio River Sand 7% pfd.	4-21-30	99	102	
Ohio River S. & G. 6's[16]	4-21-30	85	95	
Oregon P. C. com.[9]	4- 3-30	13	16	
Pac. Coast Aggregates pfd.	4-21-30	.....	15	
Pacific Coast Cem. 6's[5]	3-20-30	80	85	
Pacific P. C. com.	4-17-30	26	27	
Pacific P.C., new pfd.	4-17-30	80	85	1.62½ qu. Apr. 5
Pacific P. C. 6's	4-17-30	99½	100¼	
Peerless Cem. com.[21]	4-19-30	9	10	
Peerless Cem. pfd.[21]	4-19-30	80	85	1.75 Apr. 1
Penn-Dixie Cem. pfd.	4-21-30	45	54	
Penn-Dixie Cem.com.	4-21-30	10⅝	11	
Penn-Dixie Cem. 6's	4-21-30	82	.....	
Penn. Glass Sand Corp. 6's	4- 2-30	101½	103	
Penn. Glass Sand pfd.	4- 2-30	100	.....	1.75 qu. Apr. 1
Petoskey P. C.	4-21-30	9	10	15c qu. Apr. 1
Port Stockton Cem., units[9]	2-17-30	.....	30	
Port Stockton Cem. com.[9]	4-18-30	.....	1	
Riverside Cement com.	4-17-30	11	15	
Riverside Cement pfd.[9]	4-18-30	78	82	1.50 qu. May 1
Riverside Cement, A[9]	4-18-30	.....	16	31¼c qu. May 1
Riverside Cement, B[9]	4-18-30	4	5	
Roquemore Gravel 6½'s[17]	4-21-30	99	100	
Santa Cruz P.C. 1st 6's, 1945[8]	3-20-30	105¾	.....	6% annually
Santa Cruz P. C. com.	4-17-30	91	.....	$1 qu. Apr. 1
Schumacher Wallboard com.	4-17-30	12	14	
Schumacher Wallboard pfd.	4-17-30	23	25	50c qu. Feb. 15
Southwestern P. C. units[44]	4- 3-30	245	.....	
Standard Paving & Mat. (Can.) com.	4-22-30	24¼	24½	50c qu. Feb. 15
Standard Pav. & Mat. pfd.	4-22-30	93	95	1.75 qu. Feb. 15
Superior P. C., A	4-17-30	39	42	27½c mo. May 1
Superior P. C., B	4-17-30	12⅛	12½	25c qu. Mar. 20
Trinity P. C. units[37]	3- 8-30	135	145	
Trinity P. C. com.[37]	3- 8-30	50	.....	
Trinity P. C. pfd.[29]	4-21-30	100	110	
U. S. Gypsum com.	4-21-30	54½	54¾	40c qu. Mar. 31
U. S. Gypsum pfd.[29]	4-21-30	114	117	1.75 qu. Mar. 31
Universal G. & L. com.[3]	4-22-30	.....	50c	
Universal G. & L. pfd.[3]	4-22-30	5	10	
Universal G. & L., V.T.C.[3]	4-22-30	No market		
Universal G. &L. 1st 6's[3]	4-22-30	No market		
Warner Co. com.[16]	4-21-30	46½	47½	50c qu. Apr. 15
Warner Co. 1st 7% pfd.[16]	4-21-30	101	104	1.75 qu. Apr. 1
Warner Co. 1st 6's‡	4-22-30	99	100	
Whitehall Cem. Mfg. com.[36]	4- 4-30	40	.....	
Whitehall Cem. Mfg. pfd.[36]	4- 4-30	48	.....	
Wisconsin L. & C. 1st 6's[15]	4-22-30	95	.....	
Wolverine P. C. com.	4-22-30	5	5½	15c qu. Feb. 15
Yosemite P. C., A com.[9]	4-18-30	2¼	3¼	

†$40,189 called for redemption at 106, Feb. 26, 1930. ‡$105,000 called for redemption at 105, Feb. 25, 1930.

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Beadling & Co., Youngstown, Ohio. [5]Freeman, Smith & Camp Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simons & Co., Inc., Detroit, Mich. [22]Hemphill, Noyes & Co., New York, N. Y. [24]A. B. Leach & Co., Inc., Chicago, Ill. [26]Richards & Co., Philadelphia, Penn. [28]Hincks Bros. & Co., Bridgeport, Conn. [28]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago, Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick & Co., Montreal, Quebec. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Atlantic Gypsum Products Co. 6's, 1941, $4,000 and 40 shs. com.[1]	35%	.....
Atlantic Gypsum Products 6's, 1941, $5,000; 50 shs. com. as bonus[3]	49%	.....
Consolidated Cem. com. v.t.c., 3220 shs.[1]	1½ per share	.....
Indiana Limestone deb. 7's, 1936, wtih warrants ($1,000)[4]	$500 for the lot	.....
Universal Gypsum com. trust ctfs., 800 shs.[2] (no par)	$5 for the lot	.....
Universal Gypsum com., 300 shs.[2] (no par)	$6 for the lot	.....

[1]Price at auction by Wise, Hobbs & Arnold, Boston, Dec. 18, 1929. [2]Price at auction by Adrian H. Muller & Son, New York, Dec. 18, 1929. [3]Price at auction by R. L. Day & Co., Boston, Dec. 18, 1929. [4]Price at auction by Adrian H. Muller & Son, Dec. 26, 1929.

Ideal Cement Report for 1929

THE ANNUAL REPORT of the Ideal Cement Co., issued April 17, states:

"During said year the sales of cement slightly exceeded those of the preceding year but, owing to overproduction and disturbed market conditions in some parts of the company's territory, the net earnings show a decrease. During the latter part of the year marketing conditions in these territories showed a decided improvement and have so continued up to this date.

"During the year very favorable progress was made in the reduction of costs in the manufacture of cement per barrel.

"The outlook for the company for the year 1930 is favorable. At the date of writing this report shipments for the year to date are considerably ahead of the corresponding period in the year 1929 and net earnings are showing a corresponding increase.

"Road-building programs in Kansas and Nebraska are on a much larger scale than heretofore and the Nebraska plant will receive its share of this increased business. Sales of cement in Colorado and Montana territories are slightly in excess of the same period last year and the outlook is favorable for the balance of the year.

"The company's new cement plant in Arkansas came into production during the latter part of 1929, hence the net earning capacity of this plant is not reflected in the consolidated earning statement for the year as shown, although the investment in this plant had been paid for before the close of the year. This plant is most modern in design and economical in operation, and a cement of the highest grade is manufactured. Orders and contracts have been taken for cement which will assure the operation to capacity for the year 1930, and construction work is now in progress to substantially increase the capacity of this plant which it is expected will be available by midsummer.

"A six-year contract has been entered into for natural gas to cover the requirements of the plant at Superior, Neb., which will result in a considerable saving in the cost of fuel for that plant. Delivery of the gas will be made by September, 1930.

"During the year 1930 a 12½-in. pipe line was laid from the company's gas field in Oklahoma to the Ada plants, a distance of ten miles, and the company is now using a part of its gas requirements from its own field. The capacity of the wells already brought in is over 100,000,000 cu. ft. per day, but the company is still taking advantage of some cheap gas that can be purchased from other producers—thereby conserving the company's reserve supply.

"During the year 1929 approximately one-half of the outstanding debentures were converted into common stock, resulting in an increase in the number of shares of common stock outstanding from 403,200 to 458,271, and a decrease in the outstanding debentures from $8,279,400 to $4,146,000."

CONSOLIDATED BALANCE SHEET OF THE IDEAL CEMENT COMPANY AND ITS SUBSIDIARY COMPANIES

ASSETS

Cash, government and municipal bonds and marketable securities		$ 5,115,842.62
Accounts receivable		689,465.45
Manufactured goods		618,472.24
Inventory, goods in process, supplies, fuel and sacks		1,681,899.99
Total current assets		$ 8,105,680.30
Deferred charges		77,064.89
Plants and properties		
Plants and equipment	$22,180,062.68	
Less depreciation	4,382,845.25	$17,797,217.43
Land	$ 1,283,956.10	
Less depletion	83,490.55	1,200,465.55
Total		$27,180,428.17

LIABILITIES AND CAPITAL

Liabilities		
Accounts payable	$189,347.56	
Accrued liabilities	202,301.80	
Total current liabilities		$ 391,649.36
Fifteen-year 5% convertible gold debentures outstanding		4,146,000.00
Reserves		106,922.64
Stock of sub-companies not owned		11,476.04
Capital		
Surplus represented by 458,271 shares of no par value common stock		22,524,380.13
Total		$27,180,428.17

EARNINGS STATEMENT

Net earnings from operation after depreciation and federal income taxes	$1,680,332.56
Miscellaneous earnings aside from cement manufacture	431,205.96
	$2,111,538.52
Less interest paid on debentures	302,944.25
Balance of net earnings available for surplus and common stock dividends	$1,808,594.27

Equivalent to $4.224 per share on average number, 428,152 shares of no par value common stock outstanding during the year.

International Cement First Quarter Earnings

THE International Cement Corp. reports for the quarter ended March 31, consolidated net income of $841,480 after expenses, interest, depreciation and reserve for federal taxes and contingencies equivalent to $1.34 a share on the 628,813 no-par capital shares outstanding. This compares with $1,381,467 or $2.20 a share on the 627,865 capital shares outstanding in the preceding quarter and with $1,017,619 or $1.64 a share on 618,924 capital shares outstanding in the corresponding quarter of 1929.

Consolidated net income account of the International Cement Corp. for quarter ended March 31, 1930, compares:

	1930	1929	1928
Gross sales	$7,239,744	$7,491,036	$6,719,938
Discounts, allowances, etc.	1,424,844	1,533,811	1,274,065
Net sales	$5,814,900	$5,957,225	$5,445,873
Manufacturing costs	2,930,576	2,923,111	2,732,983
Depreciation	491,038	446,368	400,049
	$3,421,614	$3,369,479	$3,133,032
Manufacturing profits	$2,393,286	$2,587,746	$2,312,841
Selling expenses, etc.	1,150,866	1,173,899	1,013,759
Net profits	$1,242,420	$1,413,847	$1,299,082
Interest charges, etc.	192,314	147,722	16,944
	$1,050,106	$1,266,125	$1,282,138
Federal taxes and contingencies	208,626	248,506	214,210
Net income	$ 841,480	$1,017,619	$1,067,928

Construction Materials Corp. Financial Statement

THE ANNUAL REPORT of the Construction Materials Corp., Chicago, Ill., and subsidiaries for the year ended December 31, 1929, reveals a slight decrease from the record earnings of the preceding year. This showing is regarded by officials as being very satisfactory, in view of the fact that operations were retarded by the late spring and the early winter closing of 1929.

The consolidated net income for 1929 was $961,845, after all charges including federal taxes, as compared with an adjusted net income of $1,005,759 in 1928. This is equal to $12.82 a share on the 75,000 shares of $3.50 dividend preferred stock outstanding against $13.41 a share on the same number of shares in 1928. After the payment of preferred dividends, the balance available for the common stock was equal to $3.98 a share on the 185,000 shares outstanding as compared with $4.04 a share on the same capitalization in the preceding year.

The consolidated balance sheet as of December 31, 1929, shows current assets, including a cash item of $765,920, totaling $1,697,997 against current liabilities of $696,455. Total assets at the end of 1929 were $7,576,615 against $5,804,390 as of December 31, 1928, the latter figure being adjusted to give effect to the acquisition of the R. F. Conway Co. by a subsidiary.

A comparison of the consolidated balance sheet follows:

ASSETS

	December 31 1929	*1928
Current assets:		
Cash	$765,920	$761,204
Notes receivable	.....	11,133
Accounts receivable	571,608	550,792
Inventories	340,810	349,937
Cash value of life insurance	19,659	15,940
Total current	$1,697,997	$1,689,006
Fixed assets	5,441,582	3,896,386
Goodwill	1	1
Deferred charges	105,524	78,591
Due from affiliated companies	.....	140,406
Other assets	331,511	.....
Total assets	$7,576,615	$5,804,390

LIABILITIES

Current liabilities:		
Accounts payable and accrued expenses	$354,486	$204,624
Tax reserve	131,316	31,410
Estimated winter charge reserve	.....	22,000
Real estate mortgage, due April 1, 1930	25,000	.....
Real estate purchases contingency	5,000	.....
Note payable	1,500	.....
Dividends payable	43,750	.....
Reserve for completion of contracts	135,402	.....
Total current	$696,455	$258,034
Capital stock and surplus†	6,360,161	5,546,356
Real estate mortgage	145,000	.....
Vessel mortgages	225,000	.....
Reserve for contingencies	150,000	.....
Total liabilities	$7,576,615	$5,804,390

*Pro forma.
†Represented by 185,000 shares of no par common and 75,000 shares of no par preferred.

J. R. Sensibar, president, made the following comments regarding the company's activities in 1930:

"With the work on hand, we anticipate the full employment during 1930 of not only the present equipment, but also of a new

boat, which is now being equipped. In the gravel division, the outlook for 1930 is for a volume of business approximately double that of last year. The new Ferrysburg, Mich., plant is expected to be in full operation by late spring, 1930. With the completion of this plant, which will have an estimated annual capacity of 2,000,000 tons, we will be in a position to supply all lake ports with sand and gravel through the use of mechanical self-unloading boats."

Alpha Cement Report for Year Ending March 31

THE Alpha Portland Cement Co. reports for 12 months ended March 31, 1930, net income of $1,654,098 after depreciation and federal taxes, equivalent after 7% preferred dividend requirements, to $2.13 a share on 711,000 no-par shares of common stock.

The consolidated income account for 12 months ended March 31, 1930, follows: Net sales, $11,183,880; operating expenses, $8,279,150; operating profit, $2,904,730; other income, net, $281,865; total income, $3,186,595; depreciation, $1,307,497; federal taxes, $225,000; net income, $1,654,098; preferred dividends, $140,000; common dividends, $2,133,000; deficit, $618,902.

The consolidated balance sheet of the Alpha Portland Cement Co. as of March 31, 1930, compares as follows:

ASSETS

	1930	1929
*Land, buildings, machinery, equipment, etc.	$21,774,004	$21,932,994
Cash	1,873,677	2,914,835
Call loans	100,000	2,600,000
Certificate of deposit	2,500,000	.....
United States government bonds, etc.	1,362,975	1,357,975
Working funds, advances, etc.	186,123	217,987
Accounts and notes receivable	511,841	399,150
Inventories	3,039,085	2,895,380
Miscellaneous investments	273,039	273,039
Deferred charges	155,925	138,317
Total	$31,776,669	$32,729,677

LIABILITIES

7% preferred stock	$2,000,000	$2,000,000
†Common stock	24,134,500	24,134,500
Accounts payable	424,686	364,411
Federal tax, etc.	210,519	268,061
Dividend payable	533,250	533,250
Reserves	719,979	713,969
Earned surplus	3,753,735	4,715,486
Total	$31,776,669	$32,729,677

*After depreciation, depletion, etc. †Represented by 711,000 no par shares.

Penn-Dixie Cement Report for First Quarter

THE Pennsylvania-Dixie Cement Corp., New York City, reports for 12 months ended March 31, 1930, net income of $329,136 after depreciation, depletion, interest and federal taxes, equivalent to $2.42 a share on $13,588,800 of 7% preferred stock.

The consolidated income account of Pennsylvania-Dixie Cement Corp. and subsidiaries for 12 months ended March 31, 1930, follows: Profit $2,479,723; depreciation and depletion $1,393,314; interest $700,285; provision for federal taxes $56,988; net profit $329,136.

Consolidated balance sheet of Pennsylvania-Dixie Cement Corp. and subsidiaries as of March 31, 1930, compares as follows:

ASSETS

	March 31, 1930	Dec. 31, 1929
†Land, buildings, machinery and equipment	$24,987,226	$25,140,835
Cash	1,851,841	2,987,264
Notes and accounts receivable	654,789	686,512
Inventories	3,125,590	2,602,418
Miscellaneous investments	427,910	372,964
Insurance fund, etc.	129,740	41,230
Deferred charges	33,153	37,782
Total	$31,220,249	$31,869,005

LIABILITIES

Preferred stock	$13,588,800	$13,588,800
*Common stock	4,000,000	4,000,000
Gold bonds	11,353,000	11,564,000
Accounts payable	222,853	206,449
Accrued taxes, interest, etc.	166,652	379,639
Federal tax reserve	70,143	98,767
Other reserve	93,972	95,192
Surplus	1,724,829	1,936,158
Total	$31,220,249	$31,869,005

*Represented by 400,000 no-par shares. †After depreciation and depletion.

The company's officials report that sales volume for the first quarter of the current year was slightly greater than for the same period last year. Sales price was less than in 1929 because shipments were largely on contracts booked during the very low price period last summer and fall.

Total cost, however, was reduced more than the shrinkage in price so that the net income showing was somewhat better than last year. As these old low priced contracts are completed, benefit of the restored price level will become more apparent in the near future.

Foreign cement continues to have a seriously adverse effect on the domestic industry, according to the company's officials. They believe it is of the utmost importance that Congress in its final disposition of the tariff bill give the cement industry tariff protection.

As of March 31, last, current assets were in the ratio of 12 to 1 to current liabilities. Cash was more than $1,000,000 higher than a year ago while inventories were nearly $500,000 lower. Receivables were also lower.

Calaveras Cement Earnings for 1929

A DECLINE in building projects involving the use of cement and reductions in prices during the latter part of the year were evidenced in the annual report of the Calaveras Cement Co., San Francisco, Calif., which reported a net profit of $524,853 for the year ended December 31, 1929, against $636,361 in 1928. The net profit last year, after dividends on the preferred stock, amounting to $152,133, was equal to $2.98 a share on 125,078 shares of common outstanding at the end of the year.

The outlook for 1930, however, is encouraging, according to Arthur B. Shelby, vice president and general manager, who says that highway construction projects will consume large quantities of cement, and contemplated municipal improvements and railroad construction, if carried out, should materially increase the volume of 1930 construction.

Earnings available for the common stock last year amounted to $367,080, of which $17,948 were profits from the sale of capital assets. This non-recurring profit was equivalent to 19 cents a share on the common, earnings from operations being the equivalent to $2.79 a share.

Capital assets are being depreciated rapidly. The statement shows total land, buildings, machinery and equipment carried at $1,664,414. This is 19% less than the figure published as of March 31, 1929.

The company ended the year in a favorable current position with the ratio of current assets to current liabilities 6.8 to 1, and cash and call loans alone, 3.5 times current liabilities. Current liabilities consist only of estimated federal income taxes for the year and dividends payable January 15, 1930.

The company considers the 1929 showing gratifying in view of the unsatisfactory condition of the national cement industry. Only the economically situated and managed companies have been able to operate satisfactorily, the company maintains.

The company's income account, as of December 31, compares as follows:

	1929	1928
Net sales	.....	$2,017,253
Cost of sales	.....	1,082,957
Gross profit	$820,480	934,296
Selling and general expenses	*313,575	197,416
Other income	17,948	16,491
Operating profit	.....	736,879
Deduct interest	.....	28,000
Provision for federal taxes	.....	89,009
Net profit	$524,853	$ 636,361

*Includes federal income taxes.

The balance sheet, as of December 31, 1929, and March 31, 1929, compares as follows:

ASSETS

	Dec. 31, 1929	March 31, 1929
Cash and call loans	$717,599	$359,664
Accounts and notes receivable	266,775	458,778
Inventories	399,518	247,968
Total current	1,383,874	1,066,412
Land, buildings, machinery and equipment, less reserves	1,664,414	1,982,146
Investments at cost	30,050	.....
Deferred charges	11,879	5,925
Balance due on sales contracts	159,500	.....
Total assets	$3,249,719	$3,054,484

LIABILITIES

Current liabilities	$204,213	$265,131
Preferred stock	2,253,900	2,191,500
Common stock	52,578	51,330
Surplus	739,028	546,523
Total liabilities	$3,249,718	$3,054,484

Pacific Coast Cement Earnings

BOND INTEREST was earned one and three-quarters times by Pacific Coast Cement Corp. during its first year of operation, which started January 1, 1929. The balance sheet showed current assets six times current liabilities and total assets of $4,110,431.

The company started production of cement February 15, 1929, and its first year's output has been about 40% of capacity. An order for 300,000 bbl. of cement for the construction of the Northwestern Electric Co.'s Ariel dam at Woodland, Wash., was recently received by the plant.

The company is controlled by the Pacific Coast Co.

Pacific Portland Cement Earnings

R. B. HENDERSON, president of the Pacific Portland Cement Co., San Francisco, Calif., has reported that for year ended December 31, 1929, company earned $5 a share on 82,500 shares of common stock outstanding, after payment of $455,000 preferred dividends. This indicates a net income after all charges, of $867,500 for the year, and compares with net income of $836,534, or $4.62 a common share, in 1928.

Balance Sheet of New York Trap Rock Corp.

THE balance sheet of the New York Trap Rock Corp., New York City, operating a string of quarries and crushing plants on the Hudson river, is reported as follows, for the year ending December 31, 1929:

CONSOLIDATED INCOME ACCOUNT, YEARS ENDED DECEMBER 31

	1929	1928
Net operating profit	$3,041,954	$2,742,018
Depreciation and depletion	421,661	428,652
Net income	2,620,293	2,313,366
Other income	69,241	84,444
Total income	2,689,534	2,397,810
Fixed charges	415,318	443,966
Balance	2,274,216	1,953,844
Federal taxes	239,761	274,062
Other charges	38,672	64,702
Balance for dividends	1,995,783	1,615,080
Minority dividends	6,177	15,668
Preferred dividends	140,000	140,000
Common dividends	540,000	.....
Surplus	$1,309,606	$1,459,412
‡Earned per share, common	$10.28	$8.11

‡Number of common shares, 180,000.

CONSOLIDATED BALANCE SHEET AS OF DECEMBER 31

Assets:	1929	1928
Property and plants	$17,890,505	$17,351,832
Current assets:		
Cash	963,183	436,205
Marketable securities	185,459	238,670
Accounts and notes receivable (net)	1,853,832	2,057,820
Inventories	706,964	490,978
Deposits, etc.	153,912	129,543
Deferred charges, etc.	85,902	55,497
Total	$21,839,756	$20,760,545
Liabilities:		
*Preferred stock	$2,000,000	$2,000,000
†Common stock	5,875,925	5,875,925
Earned surplus	3,897,658	2,838,141
Funded debt	6,572,000	6,999,000
Current liabilities:		
Reserve for federal taxes	286,059	302,993
Notes and accounts payable and accruals	1,050,205	840,777
Reserve for depreciation, etc.	1,691,229	1,429,655
Minority interest	88,855	96,230
Capital surplus	377,825	377,825
Total	$21,839,756	$20,760,546
Currents assets	$3,709,438	$3,223,673
Current liabilities	1,336,264	1,143,770
Working capital	$2,373,174	$2,079,903

*Represented by 20,000 no par shares. †Represented by 180,000 no par shares.

Monolith Portland Cement Annual Report

THE Monolith Portland Cement Co., Los Angeles, Calif., for the year ended December 31, 1929, reports net profits, before interest charges and federal income taxes, of $309,761, compared with $442,353 for the previous year. Net sales for the period were $2,421,000, compared with $2,630,000 in 1928.

The decrease in earnings is attributed by company officials to depressed conditions in the building industry in 1929, and also to the fact that the price of cement for that year showed an average decrease of 40½%.

The company reports that during the last six months of 1929, its plant at Tehachapi was rebuilt, and as a consequence, present production is more uniform together with a lower operating cost. In effecting these improvements, it was necessary to close the plant temporarily.

The balance sheet, as of December 31, 1929, follows:

ASSETS

Cash	$ 260,693
Accounts and notes receivable	104,754
Inventories	342,728
Non-current assets and investments	1,525,249
Fixed assets—plant and equipment	2,892,327
Limestone deposits—leasehold on	2,640,246
Prepaid and deferred items	121,491
Good will and patents	1
Total	$7,887,488

LIABILITIES

Current liabilities	$ 336,736
First mortgage 6% bonds	1,000,000
Preferred stock outstanding	1,500,000
Common stock, no par, stated value	2,247,240
Capital surplus	2,438,557
Earned surplus	364,955
Total	$7,887,488

Balance Sheet of Rockland and Rockport Lime Corp.

THE annual balance sheet of the Rockland and Rockport Lime Corp., Rockland, Me., is reported as follows:

CONSOLIDATED INCOME ACCOUNT, YEARS ENDED DECEMBER 31

	1929	1928
Gross income	$1,223,906	$1,692,299
Operating expenses	1,242,419	1,616,273
Net operating profit	(d) 18,513	76,026
Other income	(dr) 11,416	(dr) 1,294
Total income	(d) 29,929	74,732
Interest, depletion and depreciation	178,313	159,121
Balance	(d)208,242	(d)84,389
Dividends	9,000	44,844
Deficit	$217,242	$129,233

INCOME ACCOUNT, YEARS ENDED DECEMBER 31 (COMPANY ONLY)

	1929	1928
Gross income	$859,800	$1,295,406
Operating expenses	962,612	1,322,894
Depreciation	*98,466	60,646
Operating loss	201,278	88,134
Other income	3,481	5,810
Total income	(d)197,797	(d)82,324
Interest charges	.....	33,644
Balance	(d)197,797	(d)115,968
Dividends	.....	35,844
Deficit	$197,797	$151,812

*Includes interest charges.

BALANCE SHEET AS OF DECEMBER 31

Assets:	1929	1928
Plant and equipment	$2,227,490	$2,292,443
Other investments	597,304	581,903
Current assets:		
Inventories	195,342	262,375
Cash	28,616	36,403
Notes and accounts receivable	81,531	129,956
Treasury stock	77,940	77,940
Other assets	60,486	26,083
Total	$3,268,709	$3,407,103
Liabilities:	1929	1928
First preferred stock	$1,024,275	$1,024,275
Second preferred stock	587,500	587,500
Common stock	850,000	850,000
Bonded debt	530,500	544,500
Current liabilities:		
Notes payable	60,000	5,000
Accounts payable, etc.	75,163	60,914
Accrued interest, etc.	32,983	29,120
Deferred notes payable	35,000	40,000
Reserves	65,510	25,041
Surplus	7,778	240,780
Total	$3,268,709	$3,407,103
Current assets	$305,489	$428,735
Current liabilities	168,146	95,034
Working capital	$137,343	$333,701

Blue Diamond Company Financial Sheet

THE BALANCE SHEET of the Blue Diamond Co., Los Angeles, Calif., producers of sand, gravel, lime, gypsum and cement, for 1929, with a comparison of the figures for 1928, is as follows:

INCOME ACCOUNT, YEARS ENDED DECEMBER 31

	1929	1928
Net sales	$4,413,693	$4,500,829
Cost of sales, etc.	3,704,623	3,950,673
Gross income	709,070	550,156
Selling, administrative and general expenses	316,415	347,839
Net profit	392,655	202,317
Other income (debit)	16,587	30,683
Total income	376,068	171,634
Interest charges	60,498	53,681
Amortization of bond discount and expenses	10,863	.....
Federal taxes	27,527	.....
Net income	$277,180	*$117,953
Earned per share	$13.52	$5.75

Number of shares, 20,500.

*Before federal income tax; fire loss, $61,313, and $46,717 bond discount expense (1924 issue).

BALANCE SHEET AS OF DECEMBER 31

ASSETS

	1929	1928
Plant and equipment (less depreciation)	$2,951,850	$2,997,124
Trade-marks, etc.	1	.....
Investments	.....	27,287
Currents assets:		
Notes and accounts receivable	494,229	522,919
Inventories	300,986	211,347
Cash	274,537	233,368
Other assets	708,451	395,500
Deferred charges	176,900	215,558
Total	$4,906,954	$4,603,103

LIABILITIES

Capital stock	$2,050,000	$2,050,000
Bonded debt	910,000	950,000
Current liabilities:		
Notes and accounts payable	283,886	177,766
Accrued liabilities	4,550	10,182
Reserved for income tax	27,527	1,000
Deferred liabilities	27,979	28,791
Surplus	1,603,011	1,385,364
Total	$4,906,954	$4,603,103
Current assets	$1,069,752	$967,634
Current liabilities	315,963	188,948
Working capital	$753,789	$778,686

Concrete Products, Ltd., Preferred Offered

McARA Brothers Agencies, Regina, Can., are offering $50,000 7% cumulative preferred stock of Concrete Products, Ltd., Regina, at a price of $100 per share, carrying a bonus of one share of common with each preferred share. The stock is callable at 110 on 60 days notice on or after the expiration of two years from date of issue.

The Concrete Products, Ltd., manufactures a variety of concrete products such as sewer pipe, block, culverts, etc. New financing was for the purpose of acquisitions and to provide working capital.

Recent Dividends Announced

Bessemer L. & C. Class A. (qu.)	$0.75	May 1
Consol. Oka S. & G. pfd. (qu.)	1.75	Apr. 1
Construct. Mater. pfd. (qu.)	0.87½	May 1
Kentucky Consol. Stone pfd. (qu.)	1.75	May 1
Missouri P. C. (qu.)	0.50	May 1
Riverside Cement A (qu.)	0.31¼	May 1
Riverside Cement pfd. (qu.)	1.50	May 1
Superior P. C. Class A (mo.)	0.27½	May 1

Foreign Abstracts and Patent Review

Influence of Fluxing Materials on Grinding. The fluidity of the slurry prepared in the plant for producing portland cement clinker depends to a considerable degree upon the extent to which the raw materials entering the mill can be disintegrated by washing. An investigation was made to determine the influence of the fluxing material on the disintegration rate of a mixture of marl and chalk (76% $CaCO_3$) in the wash mill. The grinding tests were conducted on raw materials in laboratory type ball mills. The marl and chalk were crushed in a Black crusher and passed over screens having 1- and 4-mesh per sq. cm., respectively. The overs of marl and chalk upon the 4-mesh screen were then mixed together in the required proportion. Then two batches, each of 1 kg., were weighed out and placed in two porcelain drums of similar size which contained porcelain balls of like weight and number. One drum received water without any fluxing material; the other drum received a 0.04 *N* Na_2CO_3 and a 0.1% molasses solution (based on the weight of the weight of the slurry). Both drums, hermetically sealed, were placed in the same mill.

Grinding was maintained for 30 minutes. A screen analysis and an analysis by elutriation was then made in the Schoene apparatus. The results are given in Table 1.

TABLE I—GRINDING ANALYSIS OF RAW SLURRY

Screen (per sq. cm.) and fractions	Size of granules mm.	Percentage—With fluxing material	Percentage—Without fluxing material
4 mesh	>3	21.56	26.27
25 mesh	3–1.2	0.82	1.12
64 mesh	1.2–0.75	0.08	1.13
120 mesh	0.75–0.54	0.05	0.07
400 mesh	0.54–0.30	0.10	0.12
900 mesh	0.30–0.20	0.09	0.11
IV fraction	0.20–0.04	2.10	2.79
III fraction	0.04–0.025	0.77	1.62
II fraction	0.025–0.01	4.43	9.24
I fraction	under 0.01	70.00	58.53

They indicate the accelerating influence which the fluxing material exerts upon the reduction in size of the raw material.

The effect of the action of the electrolytes may be increased by first heating the water which is to be used; the water is thus considerably softened. In order to decrease the volume of water used in the slurry in actual operation, soda and molasses can be used individually or in various mixed proportions, in dependence upon the condition of the water. The introduction of the electrolytes decreases the consumption of fuel, increases the output of the kiln, crushers and pumps, and calls for smaller bins and tanks.—*Zement* (1930), **19**, 5, p. 96.

Investigation of Concrete Building in Prague. In October, 1928, newspapers the world over carried the news that a corner building being erected of reinforced concrete in Prague, Czechoslovakia, had collapsed and killed 46 people. According to the legal opinion of the investigating expert, Prof. Rudolf Kukac, Prague, the collapse of the building under construction was due partly to faulty mixing and pouring of the concrete and to weaknesses in design. According to the evidence, there was nothing wrong with the cement, but plenty with the men in charge.—*Beton u. Eisen* (1929) 24, pp. 447-448.

Sand-Lime Brick Production. The author gives the elementary principles relating to the production of sand-lime products, from the preparation of the raw material to the finished material. According to the experiences of Leduc, the purity of sand exerts a great influence upon the strength of the product obtained. Products made with siliceous sand have a strength of 180 kg. per sq. cm.; but if 10% clay is added, the strength is only 110 kg.; and when 10% limestone ($CaCO_3$) is added, it is only 107 kg. Cinders and slag are used in sand-lime products. Leduc states that a cinder of the following composition is used in England: SiO_2, 40.60%; Al_2O_3, 18.50%; Fe_2O_3, 22.80%; CaO, 11.20%. This gives a sand-lime product of the following composition, when 8½% of lime is added: SiO_2, 32.50%; Al_2O_3, 14.80% Fe_2O_3, 18.20%; CaO, 17.00%; MgO, 5.5%; combined water, 12.00%.—*Rev. des Mater. de Constr. et de Trav. Pub.* (1929) **242**, pp. 419-422.

The "Boehmite" of the Bauxites. Hocart and de Lapparent, in a recent paper delivered at the French Academy of the Sciences meeting, report that one of them has indicated in certain bauxites the existence of microscopic crystals of a mono-hydrate of alumina (Al_2O_3HO), which he designated *boehmite*, of orthorombic symmetry but differing from *diaspore* in certain ones of its properties.

Previously Boehm, in studying the radiograms, realized by the action of x-rays (Debye and Scherrer process) upon certain hydrates of alumina and on some bauxites, had shown that the existence of a mono-hydrate of alumina can be deducted, which he designated bauxite homologous with the lepidocrocite ($Fe_2O_3H_2O$), the diaspore being the other part homologous to the goethite.

The identity of the Boehmite and the bauxite of Boehm appeared infinitely probable, but it had not been clearly shown, until these investigators' findings.

With some radiograms obtained by one of the authors (Debye and Scherrer process) of the *lepidocrocite* as well as the *boehmite*, they have been able to amass small crystals in sufficient number (bauxites of Pereille, Ariege) showing a correspondence of lines which left no doubt as to the structural relation of these two minerals. Moreover, the lines of the radiogram of the "boehmite" corresponded also to those that can be observed in the radiogram of "bauxite" obtained by Boehm.

There can now remain no doubt as to the identity of the *bauxite* of Boehm and the *Boehmite*, and as to the composition of the latter.

The theories made by one of the authors on the diaspore of certain bauxites from the Fenouillet deposits, is confirmed by an accurate radiogram of these bauxites, and shown to correspond to a radiogram of goethite. Thus, the homology of the boehmite and of the *lepidocrocite* on one hand, and the diaspore and the goethite on the other hand, is found to be clearly proven.—*Ciment* (1930) **35**, 1, p. 8.

Mineral Wool Production in France. Slag wool (laine de laitier) is a new French product being marketed for use as insulation under the name "Reforme." The molten slag, on discharging from the blast furnace, is pulverized by a jet of compressed air. It is then delivered to a refractory-lined vessel where it is kept in fusion by heat supplied from oil burners. The floor of this vessel is perforated to allow the slag to pass through in fine threads to a rotating cylinder. On this drum the threads are cooled by a spray of water so that the threads of fine diameter do not stick to each other while being wound around the drum.

This insulating material resists temperatures to 1500 deg. C., has a density of 0.22, is reasonable in price, has high insulating qualities and has a coefficient of conductibility of 0.05 to 0.06 for temperatures from 200 to 300 deg. C. It is supported on a metal frame and a galvanized grating for packing with a layer of cement to protect the outside.—*Ciment* (1930) 35, 1, pp. 5-6.

Magnesia Cements. The general composition and the conditions encountered in the use of magnesia cements are discussed in detail.—*Ciment* (1929) **34**, 12, pp. 613-616.

Recent Process Patents

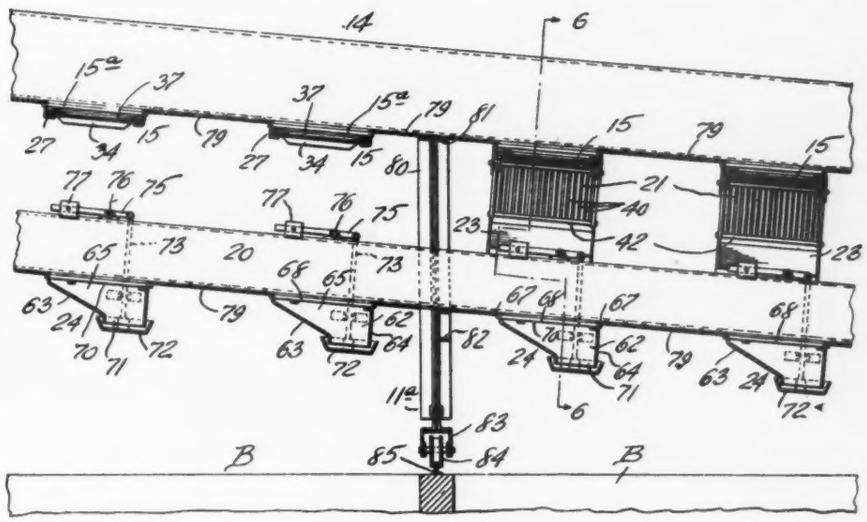
The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Washing Sand and Gravel. The method uses two troughs or flumes, one above the other. The feed, as the discharge of a dredge pump, goes into the upper flume and clear water is pumped into the lower to be used as a second wash or rinse. A series of openings in the bottom of the upper flume allows the material to fall into the lower, but these

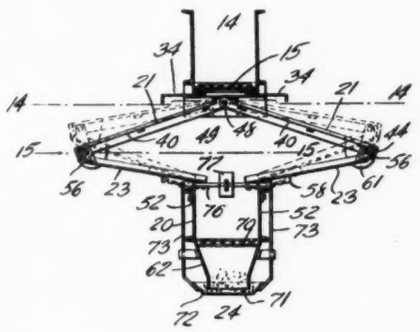
are covered by screens or bars so that the unwanted oversize is carried past them to the end of the flume.

Lateral screens placed at an angle as shown in the smaller cut allow the material passing through the screens in the upper flume to be divided, as the gravel from the sand, for example, the oversize going off at the sides, while only the fine part or sand goes to the lower flume. This is washed by the clear water in the lower flume and falls into traps which have flap valves held closed by levers and a counterweight. It the counterweight is properly adjusted, a valve will open when a certain quantity of sand has collected but will close before all the sand has run out of the pocket, thus permitting only dewatered sand to escape.

The patent paper is very long and has



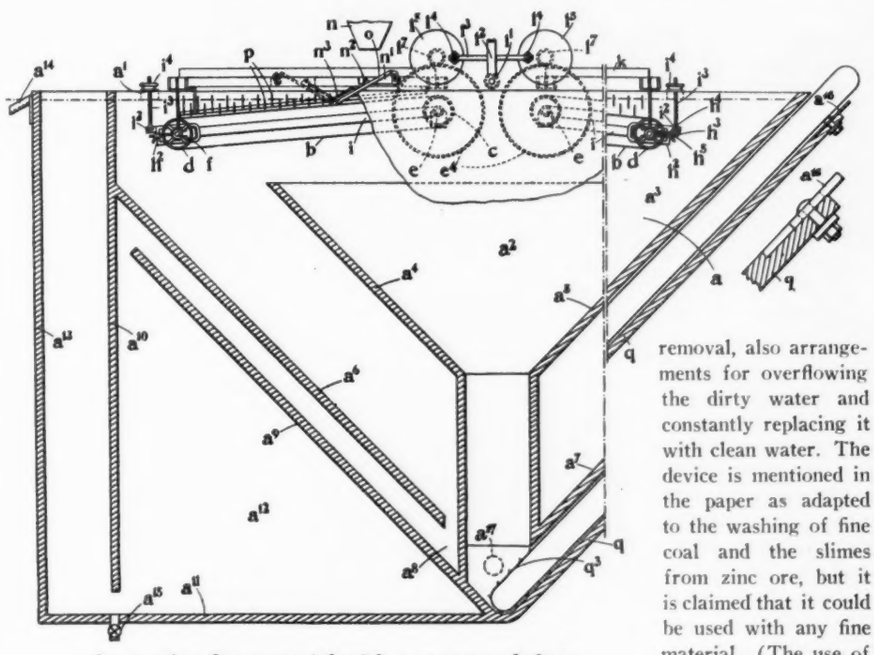
Flumes for washing sand and gravel



Lateral screens divide the sand from the gravel

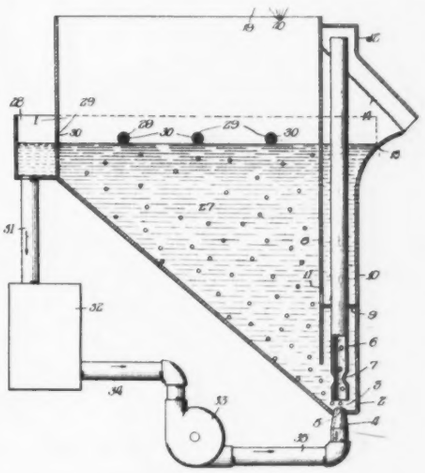
many illustrations showing the construction and means by which the washing and screening elements may be arranged to meet different conditions. It was devised to be used over the hatches of a sea-going dredge and means are shown to permit its being set to one side while the bins are being unloaded. This patent was assigned to the Buffalo Gravel Co. and its operation has been described in articles in Rock Products.—*H. S. Gerken, U. S. No.* 1,729,070.

Separating Fine Material. The method uses a broad conveyor belt, or two of them, to which a transverse motion or side-shake is given. The belts run practically submerged in water. Material fed upon a belt is stratified by the motion, the heavy particles adhering to the belt surface, while the light particles float off. The heavy particles are discharged at the high end of the conveyor. Arrangements of baffles are employed to keep the heavy particles down and to float off the light particles more efficiently. The products fall into a tank which has compartments for them and arrangements for their removal, also arrangements for overflowing the dirty water and constantly replacing it with clean water. The device is mentioned in the paper as adapted to the washing of fine coal and the slimes from zinc ore, but it is claimed that it could be used with any fine material. (The use of a conveyor belt with a side or end shake is one of the oldest methods of stratifying and separating fine mineral products, but the manner in which it is used in this device seems to be new.)—*T. M. Davidson, U. S. No.* 1,719,171.



Separating fine material with a conveyor belt to which a transverse motion is given

Separating Solids from Liquids. The device shown is used in separating glue pellets from cooling water but it could be used as a thickener or washer for sand. The feed goes in anywhere at the top and the solids settle to the bottom from which they are lifted by a hydraulic elevator. The pump which supplies the pressure for the elevator draws its supply from the overflow, in the form shown but if this supply comes from a clear water source the device is a good sand washer of a form used in washing filter sands. The overflow that escapes through the holes shown is sent to a cooling system which, of course, would have no place in a sand washing device.—*J. R. Powell,* U. S. No. 1,729,547.



Device for separating solids from liquids

Statement on Portland Cement for Conference Committee

By F. M. COOGAN
Vice-President, Alpha Portland Cement Co., Easton, Penn.; Chairman, Committee Representing United States Cement Manufacturers

PRIOR to 1913 there was a tariff on cement of 8 cents per hundred pounds. The Underwood-Simmons Act placed cement on the free list. The World War and its disastrous consequences virtually placed an embargo on cement until 1922.

A countervailing duty was placed on cement by the Fordney-McCumber Act of 1923. This countervailing duty was aimed largely at importations of cement from Canada. The duty imposed on cement by Canada was at that time, and still it, 8 cents per hundred pounds.

Cement is on the free list in the existing law except for the countervailing duty. This countervailing clause has been stricken from the Hawley-Smoot bill by the Senate.

The House rate is 8 cents per hundred pounds. The Senate rate is 6 cents per hundred pounds, except that all cement "imported by (or for the use of, or for sale to) a state, county, parish, city, town, municipality, or political subdivision of government thereof, for public purposes" shall be duty free. This exception, known as the Blease amendment, practically nullifies whatever protection might be afforded by either the House or Senate rate.

The investigation of the Tariff Commission shows that the difference in cost of foreign and domestic cement laid down in seaboard points ranges from 38 cents to $1.16 per barrel, or from 10 to 30 cents per hundred pounds. Therefore it is submitted that the House rate of 8 cents per hundred pounds will not place an embargo on foreign cement. However, the proposed rate would tend to reduce the losses now being sustained by American cement manufacturers in meeting foreign competition in seaboard markets where there is an approximate consumption of 20,000,000 barrels per year.

The total quantity of cement used for public work accounts for approximately 50 per cent of the total consumption of cement in this country.

In behalf of the American cement industry, it is earnestly requested that the Blease amendment be rejected by the Conference Committee because:

(1) In the competitive seaboard area approximately 10,000,000 barrels of cement a year are purchased by political governments or subdivisions thereof for public purposes. Because of the price advantage practically all of this quantity would be purchased from foreign manufacturers, thereby insuring an increase in imports at least six times greater than the average for the past five years.

(2) There is no precedent for such discriminatory tariff legislation. The sole exceptions in past laws have been in cases of commodities easily ear-marked, such as books for public libraries, works of art for museums, and certain types of surgical instruments for public hospitals.

(3) Such a provision would be difficult to enforce. Because of the vast number of construction projects entered into jointly by railroads, on one hand, and states and counties on the other, it would be impossible to determine the exact proportion of foreign cement which would be free as against the proportion that would be dutiable. Again, under a central mixing plant system such as is now in vogue, concrete from the same identical batch might be taken by a given contractor for both private and public works. Because of these and many other complications, the cost of even partial enforcement would be prohibitive.

New Utah Cement Project Rumored

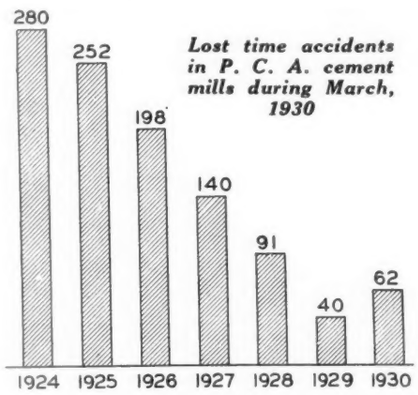
A CEMENT-ROCK ledge has been discovered near the Highland canal on the Mayfield-Gunnison road, near Gunnison, Utah. The ledge measures 240 ft. by 640 ft. and runs high in cement-making materials.

A company has been organized and the capitalization placed at $5,000,000, with R. E. Russell, of Los Angeles, as president.

Steps are being taken at once, R. S. Yardley reported, to develop the property thoroughly. It is planned to install a crushing plant soon and by fall the owners expect to be shipping rock.—*Salt Lake* (Utah) *Tribune.*

Cement Mill Accidents During March

MARCH proved an unexpectedly severe month for accidents in the cement mills, the 62 personal injury mishaps including two fatalities and four permanent disabilities.



Lost time accidents in P. C. A. cement mills during March, 1930

Accident frequency was 55% higher during the month than for March, 1929. The first quarter of 1930 produced 155 recordable accidents, of which number 5 terminated fatally, 6 caused permanent disabilities and 144 involved loss of time. During the corresponding period of 1929, 143 accidents were recorded, 3 being fatal to the victims, 8 involving permanent disabilities and 127 loss of time.

The two March accidents which terminated fatally both occurred in connection with the preparation of stone at the quarry and preliminary crushers. An employe at work after a shot barring down rock on the face of the quarry was struck by a rock which rolled down on him, causing crushing injuries from which he died a few hours later. In the second case, man regularly employed as a car dumper was thrown off a stone car on a trestle when the latter jumped the track. The victim fell 15 ft., sustaining a broken neck and fractured skull.

Other accidents of the month include loss of a foot by a workman who stepped on a loose or sprung screw conveyor cover, allowing foot to be torn by the screw, and loss of a hand by a crusher helper who was attempting to place stone under a large rock being lifted by hoist, when cable broke allowing rock to fall, crushing hand and arm.

One New York State Town Retires from Crushed Stone Business

"THE taxpayers of the town fo Poughkeepsie, N. Y., shoud be well pleased that the town board is about to carry out its plan to offer the town's stone crusher for sale and salvage what may be obtained of the money that was spent in the purchase of the equipment," says an editorial in the *Poughkeepsie Star,* which continues:

"While the motives of those who set up the stone crusher doubtless were of the best, the entrance of the town into the stone business was economically ill-advised and the operation of that business was a losing venture. Because of the limited demand of the town itself for stone, the crusher could not be operated on a production basis that would permit of anything like effective economy and even if the town had been able to sell its product on a competitive basis with private producers it was prevented from doing so by the statutory provision which prevented it from running the crusher as a commercial venture.

"How much the town may be able to get for the crusher remains to be seen. If any reasonable bid is offered, the sale will be greatly in the interests of the taxpayers, whose money has been tied up in the equipment for a long time."

M. E. Crosby Joins Macdonald Engineering Company

THE Macdonald Engineering Co., Chicago, Ill., builders of portland cement plants, announces that M. E. Crosby, well-known engineer experienced in cement plant and grain elevator work, will become its chief engineer, effective May 1, 1930.

On the same date the Macdonald Engineering Co. will move to the 47th floor of One South La Salle street.

J. E. Baker Co. Holds Safety Banquet

THE SECOND ANNUAL BANQUET of the safety committee of the John E. Baker Co. quarries, crushed stone plants, lime plants, coal mine and grey iron foundry, was held last evening in the auditorium of the York, Penn., Young Men's Christian Association building.

In addition to the members of the committee from the different Baker enterprises, wives of the men were also guests at the feast. About 150 persons attended. A turkey dinner was served. Bernard Hochberger's orchestra furnished the music. Each lady present received a corsage bouquet of cut flowers, and each man was given a rose.

J. Henry Spangler, chairman of the John E. Baker Co. safety committee, presided as toastmaster.

Following the banquet the diners enjoyed theater parties at the Strand and Capitol theaters.

The speakers included Harry D. Immel, director of the Bureau of Inspection, State Department of Labor and Industry; Thomas J Quigley, chief of the Quarry Section Bureau of Inspection, State Department of Labor and Industry, and Melvin G. Lehman, assistant director, Bureau of Workmen's Compensation, State Department of Labor and Industry. Glen Moffett, quarry inspector, State Department of Labor and Industry for this district, was also a guest.

All of the speakers expressed regret because of the absence of John E. Baker, head of the enterprises, who has been ill, but who is again spending some time daily at his main office in this city. Mr. Immel referred to him as "The Grand Old Man in Industrial Safety," and voiced appreciation for the splendid support given by the Baker organization to the safety program.—*York* (Penn.) *Gazette.*

New Canadian Cement Project

SELECTION of a site in Edmonton, Alberta, for a cement plant which will be one of a chain of six across Canada is the objective of a visit by British financiers who are expected there shortly.

The promoters of this project have an ambitious scheme for establishing highly modern plants in various provinces. They have obtained preliminary reports concerning materials in Alberta and are favorably impressed with the advantages of Edmonton.

The patents for products of proposed plants were originally obtained in Germany and then applied to the United Kingdom, Canada and the United States. Under the process used, alkali-proof cement is produced. The company has no plants in the Dominion at the present time but the scheme is said to have been well received at eastern points visited.

George R. Legore

GEORGE R. LEGORE, 45, chairman of the board of directors of the Legore Lime Co., one of the largest lime manufacturing plants in Maryland, committed suicide by jumping from the Legore bridge over the Monocacy river, a short distance from his home in Frederick, Md., April 12.

His body was found by a searching party of employes of the company in shallow water a few yards below the bridge. He left a note stating he was ill and had only a short time to live.

Deputy Sheriff Stitely and Magistrate Dorcus viewed the body and returned a verdict of death by suicide.

Mr. Legore was widely known throughout Maryland, Virginia and Pennsylvania in business circles. He was formerly a student at Washington and Lee University and for the past 25 years was associated with the Legore company, founded by his father and owned by the family—*Philadelphia* (Penn.) *Record.*

Fatal Accident at Southern Lime Plant

WITH both legs torn off as he was caught between two cars of rock at the quarry of the Southern States Lime Corp. at Crab Orchard, Tenn., at 8:30 o'clock Saturday morning, April 5, Columbus Vitatoe, 48, died less than an hour later while en route to a hospital.

No one witnessed the accident, but Vitatoe, who retained consciousness till shortly before his death, told fellow workmen who rushed on to the scene on hearing the crash that a brake rod had slipped on a loaded car on which he was standing, causing it to run wild down a steep section of track and crash into another car.

His legs were entirely severed, one at the knee and one about the ankle, and he received a deep cut on the forehead.

Vitatoe is survived by a widow and five children.—*Chattanooga* (Tenn.) *News.*

Coplay Cement Company Changes

AT a reorganization meeting of the board of directors of the Coplay Cement Manufacturing Co., the following officers were elected: Chairman of the board and president, Eugene Blum, 521 Fifth avenue, New York City; first vice-president, Herbert E. Steiner, 521 Fifth avenue, New York City; second vice-president, Abraham Israel, 1124 Land Title building, Philadelphia, Penn.; secretary and treasurer, Lee H. Burton, 521 Fifth avenue, New York City; vice-president in charge of sales, J. F. Twamley, 521 Fifth avenue, New York City; vice-president in charge of operations, D. J. Uhle, Coplay, Penn.

May Develop Nevada Silica Deposits

THAT favorable conditions are being revealed in investigations at Steamboat Springs, south of Reno, Nev., in the development of sands utilized in the manufacture of glass, was announced in Reno recently, with indications pointing to the establishment of an important industry at that point.

Representatives of Balbour, Guthrie and Co., shippers, have been engaged in prospecting the ground under lease from the Steamboat Springs Quicksilver Co., owned by D. F. Meiklejohn and others, and it is said that drilling has disclosed a large surface deposit of glass sand, averaging in depth from 30 to 40 ft. Analysis of the sand by the company is said to show it to be of excellent quality and suitable for the purposes of glass manufacture.

It is stated that plans call for the working of the deposit by power shovels and shipping to the coast glass factories. The sand used in these plants has been supplied by the shipping company from Belgium.

The company has been assisted in its quest of glass sands in Nevada by the state bureau of mines, which has supplied data as to their possible development.—*Reno* (Nev.) *Journal.*

New Oregon Pumice Discovered to Be Used for Cement Manufacture?

AFTER YEARS of extensive geological research and prospecting limestone, silica and other rocks in this region by the technical men of the Beaver Portland Cement Co., with cement plant at Gold Hill, Ore., the company has solved the problem of a better quality of cement. It has discovered a new raw material.

This is none other than the pumice stone abounding in inexhaustible high-grade deposits in the upper Rogue river district. This discovery, with the other extensive uses of pumice, according to local technical men, may yet create a mining industry now so important in Rogue river valley.

While important shipments of pumice stone have been made from this valley for chemical purposes, for a number of years it has been utilized locally in making a pressed brick, with the introduction of cheap cement made possible by the location of the cement plant here. The manufacture of this brick, however, consists nearly wholly of a mixture of pumice stone with a very small percentage of cement, resulting in a cheap constructional brick of high quality. These bricks are non-conductive, moisture-proof and will stand ordinary fire and pressure tests of the clay baked brick, and as well has the clenching value of wood when nails are driven into them.—*Portland* (Ore.) *Journal.*

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Mar. 22	Limestone Flux Week ended Mar. 29	Sand, Stone and Gravel Week ended Mar. 22	Sand, Stone and Gravel Week ended Mar. 29
Eastern	2,467	2,529	3,323	3,053
Allegheny	2,470	2,371	4,046	3,761
Pocahontas	383	440	948	1,093
Southern	711	835	7,046	7,060
Northwestern	898	767	2,135	1,735
Central Western	524	553	8,032	8,475
Southwestern	404	462	5,658	5,666
Total	7,857	7,957	31,188	30,843

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1929 AND 1930

District	Limestone Flux 1929 Period to date Mar. 30	Limestone Flux 1930 Period to date Mar. 29	Sand, Stone and Gravel 1929 Period to date Mar. 30	Sand, Stone and Gravel 1930 Period to date Mar. 29
Eastern	29,699	26,922	26,599	28,406
Allegheny	36,552	28,773	30,998	33,900
Pocahontas	2,232	2,584	4,548	7,584
Southern	5,625	7,742	86,242	77,800
Northwestern	7,850	6,869	16,234	13,957
Central Western	6,347	5,959	69,883	70,922
Southwestern	5,036	4,146	61,286	54,810
Total	93,341	82,995	295,790	287,379

COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	1930
Limestone flux	***93,341***	***82,995***
Sand, stone, gravel	***295,790***	***287,379***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning April 19:

SOUTHERN FREIGHT ASSOCIATION DOCKET

49915. **Phosphate rock,** from Florida points to Shreveport, La. Present rate, 713c per ton of 2240 lb. Proposed rate on phosphate rock (other than ground phosphate rock, slush and floats, refuse and washings from phosphate rock), carloads, minimum weight 80% of marked capacity of car, except that actual weight will govern where cars are loaded to their full visible carrying capacity, and the actual weight is less than 80% of the marked capacity, from all phosphate rock producing points in Florida shown in Item 3060, page 216, Agent Speiden's I. C. C. 1354, in Item 8, page 7, S. A. L. Ry. I. C. C. A7315, and in Note 1, page 1, of A. C. L. R. R. I. C. C. B2536, to Shreveport, La., 600c per ton of 2240 lb.

49942. **Crushed stone,** from Riverton to Warrenton, Va. It is proposed to establish reduced rate of 90c per net ton on crushed stone, carloads (See Note 3), from Riverton, Va., to Warrenton, Va., based on I. C. C. Docket 17517 scale.

47531, Amendment 1. **Marble dust,** from Brownson and Gantts Quarry, Ala., to South Bend and Michigan City, Ind. Submittal No. 47531, included in Docket No. 493, for October 28, 1929, hearing, proposed certain rates on crushed marble (description K) and marble dust (description L), from the origins above mentioned to South Bend, Ind. This proposition is now amended to suggest the same rate to Michigan City, Ind., as proposed to South Bend, Ind.

50028. **Crushed gravel,** from East St. Louis, Ill., to Atlanta, Ga. Present rate, 340c per net ton (Evansville, Ind., combination). Proposed rate on crushed gravel (See Note 3), from and to points named above, 310c per net ton.

50039. **Sand,** from Jacksonville Beach, Fla., to St. Louis, Mo., cancellation. It is proposed to cancel, on obsolete theory, published rate of 817c per net ton on sand, in packages or in bulk, minimum weight 50,000 lb., carloads, from and to above named points. Class rates to apply after cancellation.

SOUTHWESTERN FREIGHT BUREAU DOCKET

19837. **Silica,** from Rogers, Ark., to interstate points. To establish the following rates on silica, crushed or ground, carloads (See Note 3), from Rogers, Ark., to points shown below: Oklahoma City, 12½c; Tulsa, 10c; Kansas City, 11c; St. Louis, 13½c; Chicago, 18½c; Cincinnati, 19½c, and Detroit, Mich., 22c per 100 lb. The basis for the proposed rates, it is stated, is 9½% of the I. C. C. Docket 13535 first class, for the distance traversed (not short line). Rates on this commodity are now before the Interstate Commerce Commission in I. C. C. Docket 17000, Parts 11 and 11A, but there is an immediately necessity for rates between these particular points.

19851. **Limestone,** from Texas points to points in Colorado, New Mexico, Wyoming, etc. To establish rates on limestone, carloads, minimum weight 40,000 lb., from Whitestone, Cedar Park and Austin, Tex., to points in Colorado, Wyoming, Nebraska, etc., as shown in Item 2500 of S. W. L. Tariff 6-I, on the following basis: Publish the same mileage scale of rates on limestone as now applicable on granite, using also the same description as provided under columns A, B, C and D of Item 2490, S. W. L. Tariff 6-I; however, it is not desired to show specific rates to the destination points shown in this item. Shippers state that limestone is very similar to granite and is used for the same purposes. At present time they are unable to compete with the granite producers in Texas to the territory in question, because of the present rate situation, and request that they be given the same rates on limestone as prescribed by the commission in I. C. C. Docket 16978, on granite.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

CENTRAL FREIGHT ASSOCIATION DOCKET

24503. To establish on **agricultural limestone,** unburned, in open top cars only, **crushed stone,** in open top cars, and **stone screenings,** in open top cars, carloads, from Marble Cliff and West Columbus, O., to destinations in Ohio, rates as illustrated in Exhibit C attached. Present rates, as illustrated in Exhibit C attached.

EXHIBIT C

Present rates (in cents per net ton)

B. & O. destinations in Ohio	Miles	From Marble Cliff	From West Columbus
Mansfield	96.1	90	*280
St. Louisville	43.3	70	‡90
New Concord	77.6	100	100
Belmont	120.0	120	120
Eagleport	79.0	‡110	‡110
Marietta	134.3	120	*330
Peidmont	123.3	‡140	.....
Martins Ferry	145.0	*410	*360
Zimmerman	78.5	‡90	100
Edgefield	53.0	.....	85
Frankfort	59.1	.....	*270
Frosts	153.8	135	*300
Slocums	149.3	*340	*330
Sabina	51.5	90	90
Cooks	28.3	*80	80
Richmondville	86.1	*290	*270
Chillicothe	73.2	110	*260
C. C. C. & St. L. Ry.			
Delaware	25.6	‡80	70
Cardington	42.2	90	‡90
Galion	59.8	110	*270
Lilly Chapel	18.3	70	*200
Springfield	46.5	‡110	*240
Scioto	39.2	80	*210
Milford Center	31.9	.....	*210
H. V. Ry.			
Marion	47.0	70	*240
Meredith	32.2	70	*230
Radcliff	87.6	‡110	120
Alice	97.8	‡110	120
Kerrs	110.4	‡110	130
Buchtel	69.3	‡80	100
N. Y. C. R. R. destinations in Ohio			
Bucyrus	108.5	.....	*270
Philo	72.2	.....	*280
San Toy	73.0	130	*280
Modoc	81.0	100	*280
Calvin	124.3	.....	*330
N. & W. Ry.			
Lucasville	90.6	‡105	*300
Sciotoville	107.6	115	*320
Coal Grove	132.6	160	*340
Seaman	146.6	‡120	*370
Gernon	126.8	‡120	*360
P. R. R.			
East Palestine	185.3	*410	.....
Yellow Creek	164.1	*410	.....
Toronto	160.4	150	.....
Bridgeport	168.0	140	.....
Hammondville	160.7	*410	.....
Homeworth	140.6	*370	.....
Roswell	13.1	*340	.....
Handles	77.5	*290	.....
Methan	79.5	*300	.....
W. & L. E. R. R.			
Gambrinus	123.5	*340	‡135
Coshocton	99.0	.....	105
Trinway	84.0	.....	100
Tiledale	72.0	.....	95
Carrollton	135.7	*360	145
Sherrodsville	119.7	*340	135
Dillonvale	144.7	‡140	155
St. Clairsville	151.7	*360	155

Proposed rates (in cents per net ton)

	Miles	From Marble Cliff	From West Columbus
Mansfield	96.1	.....	90
St. Louisville	43.3	.....	70
New Concord	77.6	90	90
Belmont	120.0	110	110
Eagleport	79.0	90	90
Marietta	134.3	.....	120
Peidmont	124.3	110	.....
Martins Ferry	145.0	120	120
Zimmerman	78.5	.....	90
Edgefield	53.0	.....	80
Frankfort	59.1	.....	80
Frosts	153.8	130	130
Slocums	149.3	120	120
Sabina	51.5	80	80
Cooks	28.3	70	70
Richmondale	86.1	100	100
Chillicothe	73.2	.....	90
C. C. C. & St. L. Ry.			
Delaware	25.6	.....	†60
Cardington	42.2	80	80
Galion	59.8	80	80
Lilly Chapel	18.3	.....	70
Springfield	46.5	.....	†70
Scioto	39.2	70	70
Milford Center	31.9	.....	70
H. V. Ry.			
Marion	47.0	.....	70
Meredith	32.2	.....	70
Radcliff	87.6	100	100
Alice	97.8	100	100
Kerrs	110.4	¶100	¶100
Buchtel	69.3	.....	80
N. Y. C. R. R. destinations in Ohio			
Bucyrus	108.5	.....	†80
Philo	72.2	.....	90
San Toy	73.0	.....	90
Modoc	81.0	.....	100
Calvin	124.3	.....	110
N. & W. Ry.			
Lucasville	90.6	100	100
Sciotoville	107.6	110	110
Coal Grove	132.6	120	120
Seaman	146.6	120	120
Gernon	126.8	.....	120
P. R. R.			
East Palestine	185.3	140	.....
Yellow Creek	164.1	130	.....
Toronto	160.4	130	.....
Bridgeport	168.0	130	.....
Hammondsville	160.7	130	.....
Homeworth	140.6	120	.....
Roswell	113.1	110	.....
Handles	77.5	90	.....
Methan	79.5	90	.....
W. & L. E. R. R.			
Gambrinus	123.5	110	.....

Trinway	84.0	.....	†80
Coshocton	99.0	.....	†80
Tiledale	72.0	.....	†80
Carrollton	135.7	120	.....
Sherrodsville	119.7	110	.....
Dillonvale	144.7	120	.....
St. Clairsville	151.7	130	.....
B. & O. R. R. destinations in Ohio	Miles	P.S.M. 923 Scale	Single Line Scale
East Palestine	185.3	145	140
Yellow Creek	164.1	135	130
Toronto	160.4	135	130
Bridgeport	168.0	135	130
Hammondsville	160.7	135	130
Homeworth	140.6	125	120
Roswell	113.1	115	110
Handles	77.5	100	90
Methan	79.5	100	90
W. & L. E. R. R.			
Gambrinus	123.5	115	110
Coshocton	99.0	105	100
Trinway	84.0	100	100
Tiledale	72.0	95	90
Carrollton	135.7	125	120
Sherrodsville	119.7	115	110
Dillonville	144.7	125	120
St. Clairsville	151.7	135	130

Explanation of References

‡Under intermediate application.

*Sixth class.

†To meet rate now in effect via P. R. R. direct.

¶Intermediate to destinations named in Inf. Cir. 10006 at rate of 100c.

§To clear fourth section.

24504. To establish on **sand and gravel,** carloads (See Note 3), from Wapakoneta, O., to Deshler, O., rate of 80c per net ton. Route—Via B. & O. R. R. direct. Present rate, 90c per net ton.

24522. To establish on **sand and gravel,** carloads, from Mt. Carmel, Ill., to King's, Ind., rate of 70c per net ton. Present rate, class rate.

24523. To establish on **crushed stone,** carloads, from Carey, Marion and Owens, O., to points in Ohio, rates as shown below. Present and proposed rates (in cents per net ton of 2000 lb.):

From Carey, O.

	Prop.	Pres.		Prop.	Pres.
Carpenter	.....	.....	Pomeroy	110	120
Gallipolis	110	120	Rutland	.....	.....
Middleport	110	120			

From Marion and Owens, O.

Carpenter	100	110	Pomeroy	100	110
Gallipolis	100	110	Rutland	100	110
Middleport	100	110			

24527. To establish on **crushed stone,** carloads, from North Baltimore, O., to Malinta, O., rate of 70c, and to Napoleon, O., rate of 75c per net ton, via Hamler, O. Present rate, 90c per net ton.

24540. To establish on **crushed stone,** carloads, from Melvin, O., to Marietta, O., rate of $1.20 per net ton. Present, class rates.

24541. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads, from North East, Penn., to Bigler, rate of $1.60, and to Morrisdale, Penn., $1.70 per net ton. Present rate, $2.95 per net ton to Baltimore, Md.

24550. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads, from Indianapolis and Columbus, Ind., to Whitcomb, Ind., rates as shown below:

Present and Proposed Rates to Whitcomb, Ind.

From	Pres.	Prop.
Indianapolis, Ind.	(*)	95
Columbus, Ind.	92	85

*Classification basis.

24552. To cancel all proportional rates on **sand and gravel,** from Chicago, Ill., and Chicago rate points, also Hamlet and Hobart, Ind., to C. F. A. destinations, named on pages 7, 8 and 9, Supplement No. 26, P. R. R. 117A, applying in lieu thereof current local class or commodity rates.

24553. To establish on **limestone, agricultural** (not ground or pulverized), in bulk, in open-top cars; **stone, crushed,** in bulk, in open-top cars, and **stone, screenings,** in bulk, in open-top cars, in straight or mixed carloads, from Maple Grove, O., to Scotts, Paw Paw and Lawrence, Mich., rates (in cents per net ton) as shown below:

To	Pres.	Prop.
Scotts, Mich.	18½	155
Paw Paw, Mich.	21½	195
Lawrence, Mich.	21½	195

Route—To Scotts, Mich., via P. R. R., Vicksburg, Mich., G. T. Ry. To Paw Paw, Lawrence, Mich., via P. R. R., Toledo, O., P. M. Ry.

24554. To establish on **crushed stone, crushed stone screenings,** and **agricultural limestone** (not ground or pulverized), in bulk, in open-top cars, carloads (See Note 3), from Maple Grove (Narlo), O., to destinations in Michigan, rates as shown below:

To	Pres.	Route	Prop.
Hartford, Mich.	21½	1	175
Lawrence, Mich.	21½	1	185
Paw Paw, Mich.	21½	1	185

Route: 1—N. Y. C. & St. L. R. R., Thomaston, Ind., P. M. Ry.

24566. To establish on **crushed stone,** carloads (See Note 3), from Greencastle and Limedale, Ind., to stations on the B. & O. R. R., rates as shown below:

Road	Station	Prop.
B. & O.	St. Joe	145
B. & O.	Milford Jct.	135
B. & O.	Walkerton	125

Present rates are class rates.

TRUNK LINE ASSOCIATION DOCKET

23286. **Sand, engine,** in open top equipment, carloads (See Note 2), from Berkeley Springs and Hancock, W. Va., to Cherry Run, W. Va., 70c per net ton. (Present rate, $1.20 per net ton.) Reason—Proposed rate is same as now in effect from Round Top, Md., to Cherry Run, W. Va.

23299. **Sand,** carloads (See Note 2), from Manumuskin, N. J., to Millville, N. J., 60c per net ton. (Present rate, 69c per net ton.) Reason—Proposed rate is comparable with rates on like commodities from and to points in the same general territory.

23323. **Sand** (other than blast, engine, foundry, glass, molding, quartz, silex or silica), carloads (See Note 2), from Philadelphia, Penn., to Kempton, Lynnport and Tripoli, Penn., $1.25 per net ton. Present rate, $1.40 per net ton. Reason—Proposed rate is comparable with rates to Auburn and Harrisburg, Penn.

23332. **Sand** (other than blast, engine, foundry, glass, molding and silica) **and gravel,** carloads (See Note 2), from McConnellsville, N. Y., to Utica, N. Y., $1.15 per net ton. Present rate, $2 per net ton. Reason—Proposed rate is comparable with rates on like commodities from and to points in the same general territory.

23336. **Common sand,** carloads (See Note 2), from Friend, Penn., to Pittsburgh, Penn., 80c (via Connellsville, Penn., P. & L. E. R. R.) and $1 (via Connelsville, Penn., P. R. R., or Bowest Jct., Penn., B. & O. R. R.) per net ton. Reason—Proposed rates are comparable with rates from Dunbar, Penn.

23342. **Glass sand,** carloads (See Note 2), from Mapleton district, Penn., to Coraopolis and Monaca, Penn., $1.95 per net ton. (Present rate, $2.10 per net ton.) Reason—Proposed rate is comparable with rates to Glassport, Butler and Belle Vernon, Penn.

23344. **Sand and gravel,** carloads (See Note 2), from Kenvil and Hopatcong Jct., N. J., to Carteret, Chrome, Sewaren and Perth Amboy, N. J., $1.04 per net ton. Reason—Proposed rate is same as in effect from Flanders and Carys, N. J.

23355. **Limestone, ground or pulverized,** carloads, minimum weight 50,000 lb., from Millville, W. Va., to Martinsburg, W. Va., 5c per 100 lb. (Present rate, 7c per 100 lb.) Reason—Proposed rate is same as now published from Martinsburg to Millville, W. Va.

23364. **Gravel and sand,** N. O. I. B. N., in O. C., except blast, engine, foundry, glass, molding, quartz, silex and silica, carloads (See Note 2), from Netcong, N. J., to Limecrest, N. J., 70c per net ton. (Present rate, 90c per net ton.) Reason—Proposed rate compares favorably with rate to Picatinny, N. J., also to meet motor truck competition.

23385. **Building sand,** carloads (See Note 2), from Burnham, Penn., to Pennsylvania points:

D. L. & W. R. R.	Prop.	Pres.	D. & H.	Prop.	Pres.
Berwick	155	240	Archibald	165	240
Plymouth	165	240	Providence	165	240
Scranton	165	240	Laflin	165	240
L. V. R. R.			Olyphant	165	240
Shenandoah	145	240	Carbondale	175	240
			Plymouth	165	240
			Dickson	165	240

The above rates in cents per 2000 lb.

Reason—Proposed rates are comparable with rates on like commodities for like distances and conditions.

23396. **Crushed stone,** carloads (See Note 2), from Jamesville, N. Y., to D. & H. R. R. points, Wilkes-Barre, Scranton, Carbondale, Honesdale, Lanesboro, Penn., Windsor, Port Crane, N. Y., and various. Rates ranging from $1.20 to $1.60 per net ton. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

23398. **Limestone, ground or pulverized, and limestone dust,** carloads, minimum weight 50,000 lb., from Jamesville, N. Y., to D. L. & W. R. R. points, Hallstead, Alford, Scranton, Lehigh, Mt. Pocono, Stroudsburg, Water Gap, Portland, Penn., and various. Rates ranging from $1.20 to $1.80 per net ton. Reason—Proposed rates are comparable with rates on like commodities for similar distances, services and conditions.

23417. **Limestone, ground or pulverized, and limestone dust,** carloads, minimum weight 50,000 lb., from Jamesville, N. Y. (Rates in cents per net ton.)

To	Prop.	Pres.
Presho, N. Y., to Laurelton, Penn.	190	200
Thompkins, Penn.	190	230
Nelson to Westfield, Penn.	200	230
Potter Brook, Penn.	220	230
Tannery to Ulysses, Penn.	220	260

Reason—Proposed rates are fairly comparable with rates from Jordanville, N. Y.

23425. **Crushed stone,** carloads (See Note 2), from Birdsboro, O., to Cleveland, O., $3 per net ton. (Present rate $4 per net ton.) Also amend the following shown in Agent Curlett's I. C. C. A265 as follows:

Restrict Philadelphia Group No. 28 rates not to apply from the following P. R. R. points: Frazer, Penn.; Glen Lock (Chester Co.), Penn.; Whiteland, Penn., to Woodbine (Chester Co.), Penn.; Downington, Penn., to Pomeroy, Penn.; Parkesburg, Penn.; Lenover, Penn., to Lancaster, Penn.; Landisville, Penn., to Conewago, Penn.; Middletown, Penn., to Highspire, Penn.; Phoenixville, Penn., to West Monocacy, Penn.

Restrict Baltimore Group No. 28 rates not to apply from the following P. R. R. stations: Steelton, Penn., to Rockville (Dauphin Co.), Penn.; Marysville, Penn., to Denholm, Penn.

Restrict Williamsport Group No. 28 rates not to apply from the following P. R. R. points: Vincent Lumber Co., Penn., to Petersburg, Penn.; Barree, Penn., to Altoona, Penn.; Tyrone, Penn. Reason—Proposed rate is fairly comparable with rate from Calcite, Penn.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

19373. To extend the application of the mileage scale of commodity rates published in B. & M. R. R., I. C. C. No. A2680, applying on **run of bank gravel and common building sand** (See Note 3), between stations on the B. & M. R. R. for distances up to 200 miles, to cover distances up to 250 miles at the following rates:

Over 200 miles and not over 225 miles, $1.50 net ton.

Over 225 miles and not over 250 miles, $1.60 net ton.

Also to extend the application of the mileage scale of commodity rates published in B. & M. R. R., I. C. C. No. A2680, applying on **stone dust** (except limestone), **screened or crushed gravel, slag and stone, viz.: Granite, trap rock, quartz or sandstone,** crushed or broken, including grout, rubble or chips (waste products of quarries) (See Note 3), between stations on the B. & M. R. R. for distances up to 200 miles, to cover distances up to 250 miles at the following rates:

Over 200 miles and not over 225 miles, $1.60 net ton.

Over 225 miles and not over 250 miles, $1.70 net ton.

At present the sixth class rates published in B. & M. R. R., I. C. C. A2540, apply for distances over 200 miles.

Also to change the rates in both of these scales for distances over 150 miles and not over 155 miles as follows:

Run of bank gravel and common building sand, per ton of 2000 lb. Present, $1.20; proposed, $1.30.

Stone dust, etc., per ton of 2000 lb. Present, $1.30; proposed, $1.40.

Reason—To grant shippers commodity rates for distances up to 250 miles on the same basis as those now applicable for distances up to 200 miles; also to correct a clerical error in connection with the rates for distances over 150 miles and not over 155 miles.

19418. **Agricultural limestone,** minimum weight 80,000 lb., from North Adams, Mass.

To	Pres.	Prop.
Fitchburg, Mass.	7½	7
Hubbardston, Mass.	7½	6½
South Ashburnham, Mass.	7½	6½
Westminster, Mass.	7½	6½

Reason—To accord shippers at North Adams rates comparable with those now enjoyed by shippers located at other producing points.

19419. **Gravel,** screened (See Note 3), from North Wilbraham, Mass., to West Springfield, Mass. Present rate, 85c per net ton; proposed, 60c per net ton. Reason—To meet motor truck competition.

19444. **Crushed stone,** minimum weight 50 net tons, from Lynn and Winchester, Mass., to Boston, Mass. Present rate, 70c; proposed, 60c per net ton. Reason—To meet motor truck competition.

WESTERN TRUNK LINE DOCKET

1564-V. **Stone, crushed,** carloads (See Note 2), except that when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car the actual weight will apply, but in no case shall the minimum weight be less than 50,000 lb., from Dell Rapids, S. D., to Newton, Iowa. Present rate, 11½c; proposed, 9½c.

2051-N-N. **Stone, crushed,** carloads, from Quartzite, Minn., to C. & N. W. Iowa destinations. Present rates, combination, 5½c to Sioux City, Iowa, and Iowa distance rate beyond. Proposed:

To	Rate	To	Rate
Sargents Bluff	7½	Sac City	7½
Bronson	7½	Lakeview	8½
Lawton	7½	Sacton	8½
Moville	7½	Ida Grove	8½
Kingsley	7½	Arthur	8½
Pierson	7½	Odebolt	8½
Correctionville	7½	Wall Lake	8½
Cushing	7½	Carnarvon	8½
Holstein	7½	Auburn	8½
Galva	7½	Lake City	8½
Schalier	7½	Lohrville	8½
Early	7½		

Portland Cement Output in March

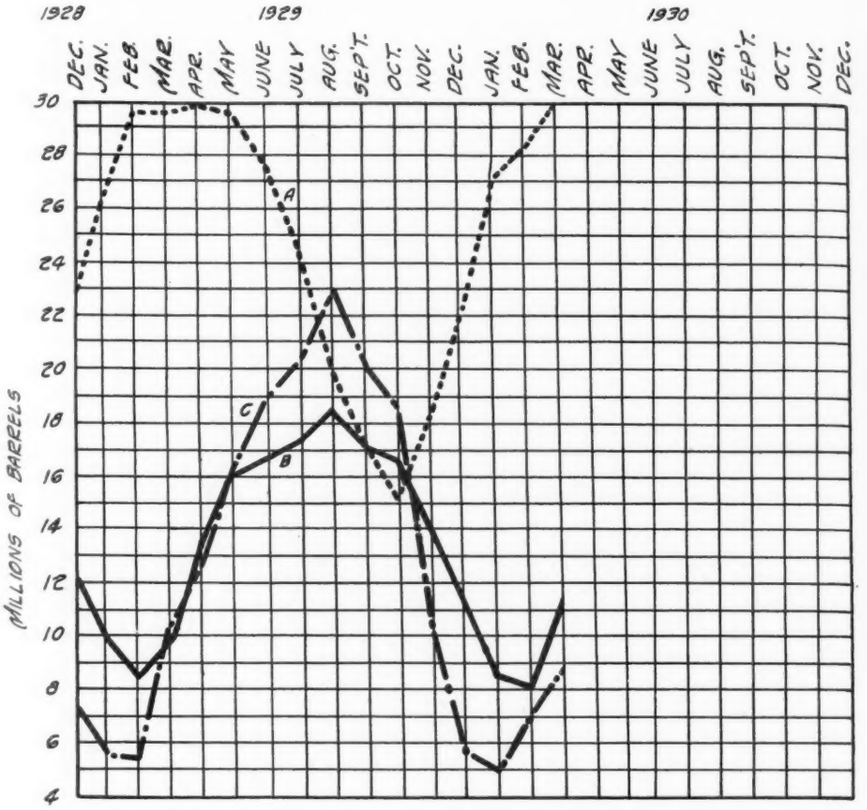
THE PORTLAND CEMENT INDUSTRY in March, 1930, produced 11,225,000 bbl., shipped 8,846,000 bbl. from the mills and had in stock at the end of the month 30,563,000 bbl., according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in March, 1930, showed an increase of 12.6% and shipments a decrease of 12.5%, as compared with March, 1929. Portland cement stocks at the mills were 2.8% higher than a year ago.

The statistics here presented are compiled from reports for March, from all manufacturing plants except two for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants at the close of March, 1930, and of 160 plants at the close of March, 1929. In addition to the capacity of the new plants which began operating during the twelve months ended March 31, 1930, the estimates include increased capacity due to extensions and improvements at old plants during the period.

RELATION OF PRODUCTION TO CAPACITY

	Mar. 1929 Pct.	Mar. 1930 Pct.	Feb. 1930 Pct.	Jan. 1930 Pct.	Dec. 1929 Pct.
The month	47.4	51.5	41.5	38.8	51.5
12 months ended	70.9	66.1	65.6	65.5	66.4



(A) Stocks of finished portland cement at factories; (B) Production of finished portland cement; (C) Shipments of finished portland cement from factories

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during January and February, 1929 and 1930:

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN JANUARY AND FEBRUARY, 1929 AND 1930, IN BARRELS*

Shipped to—	1929—Jan.—	1930	1929—Feb.—	1930
Alabama	125,356	106,309	105,162	135,425
Alaska	132	1,590	0	132
Arizona	55,771	49,286	58,844	35,218
Arkansas	47,087	43,629	40,599	80,512
California	950,884	561,220	900,811	696,999
Colorado	27,709	14,818	25,474	43,570
Connecticut	57,087	63,245	54,574	60,197
Delaware	10,183	12,810	14,459	16,100
District of Columbia	60,476	44,747	58,207	48,482
Florida	93,827	91,344	92,217	82,931
Georgia	92,494	87,956	73,064	90,938
Hawaii	21,829	27,413	20,683	25,734
Idaho	3,266	2,585	3,792	9,943
Illinois	211,984	182,347	251,883	356,200
Indiana	65,421	94,596	87,506	189,599
Iowa	17,701	34,357	21,406	111,155
Kansas	43,008	45,558	56,678	191,412
Kentucky	33,118	32,854	32,328	74,974
Louisiana	96,054	175,009	81,109	285,398
Maine	10,011	14,125	15,199	14,370
Maryland	60,058	80,253	59,087	101,896
Massachusetts	85,539	104,522	79,633	89,617
Michigan	247,190	203,440	273,538	258,450
Minnesota	30,494	59,107	44,013	111,059
Mississippi	83,044	52,518	50,254	48,264
Missouri	91,914	76,507	109,614	244,403
Montana	3,525	6,175	5,570	12,497
Nebraska	16,113	22,811	15,409	71,051
Nevada	6,703	5,452	6,905	8,306
New Hampshire	17,988	9,598	17,091	9,612
New Jersey	238,270	257,563	247,004	252,624
New Mexico	30,915	10,758	16,549	16,490
New York	746,897	681,645	667,767	663,031
North Carolina	108,492	64,998	85,373	75,768
North Dakota	2,020	2,787	2,502	10,070
Ohio	250,972	243,570	253,420	403,404
Oklahoma	153,893	99,486	112,301	234,569
Oregon	33,364	25,776	34,873	67,025
Pennsylvania	378,421	442,728	373,929	488,412
Porto Rico	500	1,750	3,745	1,750
Rhode Island	16,956	22,295	25,497	18,256
South Carolina	96,379	44,806	74,035	49,865
South Dakota	4,414	11,204	4,361	31,133
Tennessee	96,513	85,912	80,026	110,578
Texas	482,644	299,248	424,778	508,921
Utah	13,185	12,529	11,850	21,954
Vermont	8,794	21,257	14,066	14,964
Virginia	86,620	71,683	83,678	97,003
Washington	111,351	47,785	68,792	124,926
West Virginia	33,367	48,025	35,675	62,589
Wisconsin	57,769	77,039	74,696	140,053
Wyoming	4,216	2,755	3,818	6,225
Unspecified	12,410	8,760	47,710	17,732
	5,634,328	4,890,540	5,401,554	6,921,786
Foreign countries	72,672	64,460	46,446	90,214
Total shipped from cement plants	5,707,000	4,955,000	5,448,000	7,012,000

*Includes estimated distribution of shipments from three plants in January and February, 1929; from two plants in January and February, 1930.

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1929 AND 1930, IN BARRELS

Month	1929—Production—1930		Stock at end of month 1929	1930
January	12,012,000	10,504,000	9,642,000	9,646,000
February	11,255,000	10,008,000	12,436,000	*11,572,000
March	12,450,000	13,045,000	14,948,000	13,494,000
April	14,166,000	.....	15,479,000	.....
May	15,444,000	.....	14,911,000	.....
June	15,312,000	.....	13,587,000	.....
July	15,214,000	.....	11,619,000	.....
August	15,829,000	.....	8,995,000	.....
September	15,165,000	.....	7,009,000	.....
October	15,515,000	.....	5,934,000	.....
November	14,087,000	.....	6,134,000	.....
December	12,539,000	.....	7,526,009	.....

*Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS IN MARCH, 1929 AND 1930, AND STOCKS IN FEBRUARY, 1930, IN BARRELS

District	Production 1929—March—1930		Shipments 1929—March—1930		Stocks at end of month 1929	1930	Stocks at end of Feb. 1930*
Eastern Penn., N. J., Md.	2,513,000	2,717,000	2,506,000	2,318,000	6,941,000	7,028,000	6,629,000
New York	593,000	618,000	504,000	484,000	2,073,000	1,687,000	1,552,000
Ohio, West'n Penn., W. Va.	908,000	1,205,000	869,000	724,000	3,650,000	3,882,000	3,401,000
Michigan	476,000	383,000	543,000	411,000	2,591,000	2,734,000	2,761,000
Wis., Ill., Ind., and Ky.	1,086,000	1,129,000	948,000	696,000	4,049,000	4,578,000	4,145,000
Va., Tenn., Ala., Ga., Fla., La.	1,028,000	1,099,000	960,000	969,000	2,248,000	1,728,000	1,598,000
East'n Mo., Iowa, Minn., S. D.	644,000	971,000	700,000	503,000	4,297,000	3,863,000	3,395,000
Western Mo., Neb., Kans., Okla. and Ark.	620,000	945,000	905,000	839,000	1,497,000	1,940,000	1,834,000
Texas	527,000	694,000	594,000	627,000	446,000	845,000	778,000
Colo., Mont., Utah, Wyo., Ida.	57,000	240,000	144,000	163,000	451,000	517,000	441,000
California	1,170,000	873,000	1,148,000	816,000	894,000	1,187,000	1,131,000
Oregon and Washington	347,000	351,000	292,000	296,000	587,000	574,000	519,000
	9,969,000	11,225,000	10,113,000	8,846,000	29,724,000	30,563,000	28,184,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1929 AND 1930, IN BARRELS

Month	1929—Production—1930		1929—Shipments—1930		Stocks at end of month 1929	1930
January	9,881,000	8,498,000	5,707,000	4,955,000	26,797,000	27,081,000
February	8,522,000	8,162,000	5,448,000	7,012,000	29,870,000	*28,184,000
March	9,969,000	11,225,000	10,113,000	8,846,000	29,724,000	30,563,000
April	13,750,000	.....	13,325,000	.....	30,151,000	.....
May	16,151,000	.....	16,706,000	.....	29,624,000	.....
June	16,803,000	.....	18,949,000	.....	27,505,000	.....
July	17,315,000	.....	20,319,000	.....	24,525,000	.....
August	18,585,000	.....	23,052,000	.....	20,056,000	.....
September	17,223,000	.....	19,950,000	.....	17,325,000	.....
October	16,731,000	.....	18,695,000	.....	15,381,000	.....
November	14,053,000	.....	11,222,000	.....	18,213,000	.....
December	11,215,000	.....	5,951,000	.....	23,550,000	.....
	170,198,000	.....	169,437,000	.....	292,721,000	.....

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN MARCH, 1929 AND 1930, IN BARRELS

District	Production 1929	1930	Stocks at end of month 1929	1930
Eastern Pennsylvania, New Jersey and Maryland	2,958,000	3,120,000	2,526,000	2,223,000
New York	778,000	627,000	1,347,000	987,000
Ohio, Western Pennsylvania and West Virginia	1,213,000	1,341,000	1,781,000	1,643,000
Michigan	740,000	716,000	1,354,000	1,705,000
Wisconsin, Illinois, Indiana and Kentucky	1,793,000	1,626,000	2,477,000	2,012,000
Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana	1,146,000	1,195,000	1,418,000	879,000
Eastern Missouri, Iowa, Minnesota and South Dakota	926,000	1,255,000	1,102,000	1,018,000
West'n Missouri, Nebraska, Kansas, Oklahoma, Arkansas	724,000	1,031,000	796,000	475,000
Texas	554,000	656,000	216,000	507,000
Colorado, Montana, Utah, Wyoming and Idaho	188,000	207,000	536,000	225,000
California	1,079,000	877,000	967,000	1,268,000
Oregon and Washington	351,000	394,000	428,000	552,000
	12,450,000	13,045,000	14,948,000	13,494,000

Exports and Imports

(These figures were compiled from the records of the Bureau of Foreign and Domestic Commerce and are subject to revision)

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN FEBRUARY, 1930

Exported to	Barrels	Value
Canada	1,244	$5,394
Central America	6,844	16,632
Cuba	6,431	16,302
Other West Indies and Bermuda	3,548	7,934
Mexico	14,459	38,968
South America	26,936	104,851
Other countries	4,805	27,717
	64,267	$217,798

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN FEBRUARY, 1930

Imports from	District into which imported	Barrels	Value
Belgium	Florida	3,450	$3,828
	Los Angeles	47,145	30,726
	Massachusetts	50	105
	New Orleans	3,500	4,215
	San Antonio	6,300	6,429
	Total	60,445	$45,303
Canada	Maine and N. H.	500	$1,132
Denmark	Porto Rico	38,448	$52,426
France	Massachusetts	537	$1,318
	New York	1,969	3,920
	Total	2,506	$5,238
Germany	Los Angeles	1,000	$1,967
United K'gd'm	Los Angeles	2	6
	New York	9,055	11,088
	Philadelphia	2,499	2,557
	Total	11,556	$13,651
	Grand total	114,455	$119,717

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN FEBRUARY, 1930

	Barrels	Value
Alaska	1,093	$ 3,300
Hawaii	29,687	75,124
Porto Rico	1,900	4,943
	32,680	$83,367

National City Bank on Construction Outlook

THE January monthly bulletin of the National City Bank, New York City, has this to say about the prospects of construction in 1930:

Building operations and construction work of a general character constitute the most important factor in the problem of industrial recovery. Such expenditures are the chief variable element between good and bad times, for when they are large all of the industries are active, employment is full and consumption of every kind of products is at a high rate. Residence and apartment house building has been under restriction during the past year, partly from the scarcity of available funds and partly because of evidences of overbuilding. This probably, on the whole, has been helpful to the situation. Office building space also is somewhat in excess of needs, although a recent survey of 38 leading cities by the National Association of Building Owners and Managers indicates vacancies amounting to only 11.5%, and 10% is considered normal. Industrial construction in 1929 was above the figures for 1928; outside of public utilities, it may be expected in 1930 to depend upon the general state of business. Public building, highway construction, municipal improvements, railroad and public utility undertakings will be helped by President Hoover's conferences and also by the lower interest rates now prevailing. The F. W. Dodge Corp. has estimated that the aggregate of construction work in 1930 will exceed that of 1929.

It is probably not too much to say that the outlook for large construction work of the nature of municipal, highway, railroad and industrial improvements never was better, and the subsidence of speculation has the very important effect of cheapening capital for these purposes. Capital and credit had been steadily becoming dearer over the last two years, not only in our own country but throughout the world, and the stock market had been the dominating influence. We are of the opinion that in more ways than can be traced the release of several billions of credit from employment in that quarter, and the resulting decline of interest rates for all purposes, will be beneficial to general business, and that the effects will be cumulative as they spread.

Boys Still Create a Market for One Rock Product

JOHN S. SPEER, 714 North Twelfth street, Cambridge, Ohio, has purchased a substantial interest in the Christensen Agate Co. and has been appointed assistant manager of the company's plant. He takes up his new work immediately. John E. Wagner is general manager of the company and Mr. Speer will assist him in the work.

The Christensen Agate Co. is planning an extensive expansion of its plant in East Cambridge, which manufactures high grade marbles. It is one of three such plants in the United States and officials of the company announced several days ago it has sufficient orders booked to assure capacity operation for three years and that additional orders are available but cannot be filled.—*Cambridge* (Ohio) *Jeffersonian.*

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1929 AND 1930

Month	1929—Exports		1930—Exports		1929—Imports		1930—Imports	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	78,639	$283,002	82,387	$293,135	151,302	$177,976	201,609	$207,461
February	58,886	225,590	64,267	217,798	118,930	123,123	114,455	119,717
March	69,079	235,164	.....	.....	131,909	112,788	.....	.....
April	64,145	218,316	.....	.....	89,668	114,281	.....	.....
May	57,955	219,366	.....	.....	200,646	267,854	.....	.....
June	96,055	287,612	.....	.....	203,545	228,170	.....	.....
July	71,992	247,177	.....	.....	182,098	199,960	.....	.....
August	60,013	225,762	.....	.....	183,938	199,403	.....	.....
September	86,268	308,631	.....	.....	112,372	152,239	.....	.....
October	101,359	337,839	.....	.....	172,566	187,504	.....	.....
November	53,378	158,197	.....	.....	96,568	95,844	.....	.....
December	88,403	297,253	.....	.....	84,358	79,098	.....	.....
	886,172	$3,083,911	.....	.....	1,727,900	$1,938,240	.....	.....

Nearly Half a Billion a Year from the Gas Tax

THE LAST TWO STATES to adopt taxes on motor fuel—New York and Illinois—joined the others last year, with the result that almost $500,000,000 was collected in the United States from this source during 1929, and was applied mostly for highway purposes, the Department of Agriculture announced April 12.

The average state tax rose approximately ⅓ of a cent a gallon from the 3 cents that was the average in the preceding year, and the levies ranged from 2 cents in seven states and the District of Columbia to 6 cents in three states, according to the statement, which was based on information collected by the Bureau of Public Roads.

Other averages deduced from the figures were an annual gasoline tax revenue of $17.72 from each registered motor vehicle, and an annual purchase for each vehicle of 532 gallons of motor fuel.

Pennsylvania, California and Ohio led in receipts from this source. The new tax was effective in Illinois for only five months, and in New York for eight months of the year.

The Department's Statement

The department's statement follows in full text:

The 48 states and the District of Columbia collected $431,636,454 in taxes on the sale of 13,400,180,062 gallons of motor fuel in 1929, reports received by the Bureau of Public Roads of the United States Department of Agriculture show. This includes a 12-month collection in 46 states and the District of Columbia, a five-month collection in Illinois and the collections of eight months in New York.

Illinois and New York were the last states to adopt this method for part payment of the highway bill. The pioneer states—Oregon, Colorado, North Dakota and New Mexico—led the way in 1919. Now all the others have followed, but the tax did not become effective in New York until May 1 and in Illinois until August 1.

The average fee per gallon was 3.22 cents as against 3 cents in 1928. In the course of the year 20 states increased the rate of taxation either 1 or 2 cents. The highest tax per gallon was 6 cents; the lowest 2 cents. At the close of the year, three states had a 6-cent tax, 8 a 5-cent tax, 19 a 4-cent tax, 1, Utah, a 3½-cent tax, 10 a 3-cent tax and 7 states and the District of Columbia a 2-cent tax.

Average Per Vehicle

In 1929 the rate per gallon was increased 1 cent in Colorado, Florida, Indiana, Kansas, Minnesota, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, Vermont, Washington and Wyoming; 2-cent increases became effective in Georgia, Louisiana, Montana, Nebraska, Tennessee and Texas.

Comparison of the total number of vehicles registered in 1929, with the total tax collected and with the taxable gallonage in all states (except New York and Illinois) and in the District of Columbia, shows an average tax revenue of $17.72 per vehicle and an average purchase of 532 gallons of gasoline.

After deducting collection costs, the entire net revenue in 34 states was used for construction and maintenance of rural roads. In the other 14 states and the District of Columbia a total of $24,405,207 was used for other purposes. In three states part of the tax money helped support public schools. In eight states a part of the revenue went to cities for repair and improvement of streets, as did the entire collection for the District of Columbia.

In six states, small sums were deposited in general funds; in Mississippi, a special, extra tax was collected in two counties for seawall protection of highways; and in New Jersey a small fraction of the receipts was turned over to the Department of Commerce and Navigation.

Of the revenue applied to rural roads, $297,967,756 was used for construction and maintenance of state highways, $85,113,708 for construction and maintenance of local roads and the remainder, $23,371,785, applied as payments on state and county road bonds.

The following table shows the total motor fuel tax receipts and total number of gallons taxed in the several states:

Total tax collections on gasoline and other receipts, A: net gallons of gasoline taxed and used by motor vehicles, B:

	A	B
Alabama	$7,105,009	178,162,903
Arizona	2,559,839	63,995,783
Arkansas	6,681,029	133,620,566
California	34,192.087	1,139,736,244
Colorado	5,218,064	141,466,891
Connecticut	4,097,175	202,354,590
Delaware	935,947	31,198,248
District of Columbia	1,428,181	71,409,032
Florida	12,231,336	223,373,467
Georgia	10.224,108	219,609,473
Idaho	1,946,359	48.658,984
Illinois	11,659,778	388,659,266
Indiana	15,610,540	410,936,759
Iowa	9,355,785	311,859,516
Kansas	8.171,205	288,716,546
Kentucky	7,742,564	154,717,831
Louisiana	6,978,651	176,645,631
Maine	3,708,682	91,610,422
Maryland	6,297,168	157,429,197
Massachusetts	9,758,816	487,940,778
Michigan	21.312.929	710,300,302
Minnesota	8,892,125	338,631,771
Mississippi	7.176,126	140,902,401
Missouri	7,680,672	384,033,575
Montana	2.802,017	57,514,249
Nebraska	7,799,479	208,869,358
Nevada	652,301	16,307,535
New Hampshire	2,267,052	56,676,294
New Jersey	9,996,104	498,063,808
New Mexico	2,289,767	45,479,332
New York	19,087,392	962,601,285
North Carolina	12,006,384	260,210,528
North Dakota	1,801,102	71,591,708
Ohio	34,082,188	910,154.885
Oklahoma	10,841,609	314,388,292
Oregon	4,542,602	152,090,900
Pennsylvania	35,757,816	1,047,914,175
Rhode Island	1.545,961	77,826,879
South Carolina	6,871,076	118,038,130
South Dakota	3.545,765	88,644,138
Tennessee	9,290,853	194,497,225
Texas	29,317,494	761,421,692
Utah	1.979,610	56,546,967
Vermont	1,703,091	43.990,554
Virginia	9.894,941	197,898,821
Washington	5,943,039	233,333,570
West Virginia	4.873,298	121,654,788
Wisconsin	7.485,039	374,251,957
Wyoming	1,296,299	34,242,816

Highway Reference Book

A BOOKLET recently issued by the Highway Education Board, Washington, D. C., contains an exhaustive study of highway facts based on government statistics—the United States Bureau of Public Roads and the automotive division of the Bureau of Foreign and Domestic Commerce being the principal sources of supply. The 97 pages of the handbook, the first comprehensive grouping of highway statistics into one volume, are divided into 10 chapters, each treating of a separate phase of the subject.

One chapter is devoted to a general summary, an itemization of interesting features in connection with the subject. What is the longest paved road in the world; what state has the largest highway mileage; what is the shortest road and the most narrow street; what is the proportion of United States highways to the rest of the world? These and a hundred other questions are answered in the section on "milestones."

Tables giving total road mileage, road income and expenditure and other related data, by years, by types, by states and by counties appear frequently in the booklet. The total road expenditure for 1928, for instance, was $1,423,870,278, which is broken up into various sub-divisions covering construction, maintenance, administration, purchase of equipment and bond interest.

Of the total 1928 highway income of $1,566,946,170, 20% was derived from motor vehicle fees, 18% from gasoline taxes, 5% from federal aid, 17% from bonds, 27% from general taxes and 13% from miscellaneous funds. General taxes fall 2% short of covering the cost of maintenance alone.

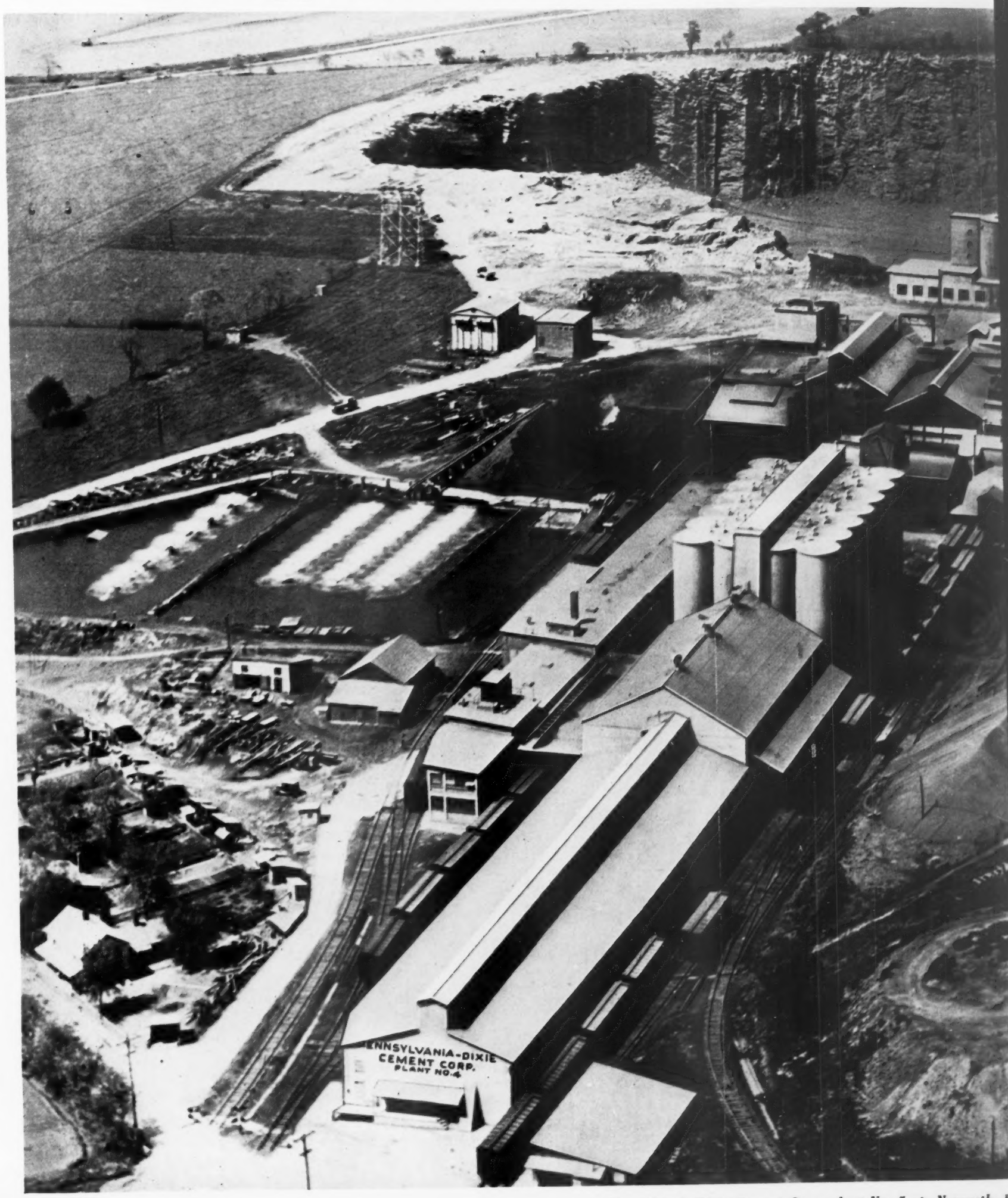
In the table on total mileage and total mileage surfaced, it is disclosed that of the 3,016,281 miles of rural roads in the United States, 69% is under the supervision of local authorities, or those other than state and federal officials.

Average automobile receipts for highway improvement have increased steadily from year to year, the booklet shows, despite or perhaps because of the growing number of automobiles. In 1919, with a registration of 7,566,446 vehicles, the average receipts per car were $8.68, while 10 years later, with a registration in excess of 24,000,000 automotive vehicles, the average income per car was $25.63.

A chapter on federal aid operations falls second in the booklet, while separate chapters are allotted to the state highway systems and to county and local activities.

World highway mileages afford a vivid comparison of the growth of automotive transportation in the United States, statistics for 137 nations and autonomous countries being presented.

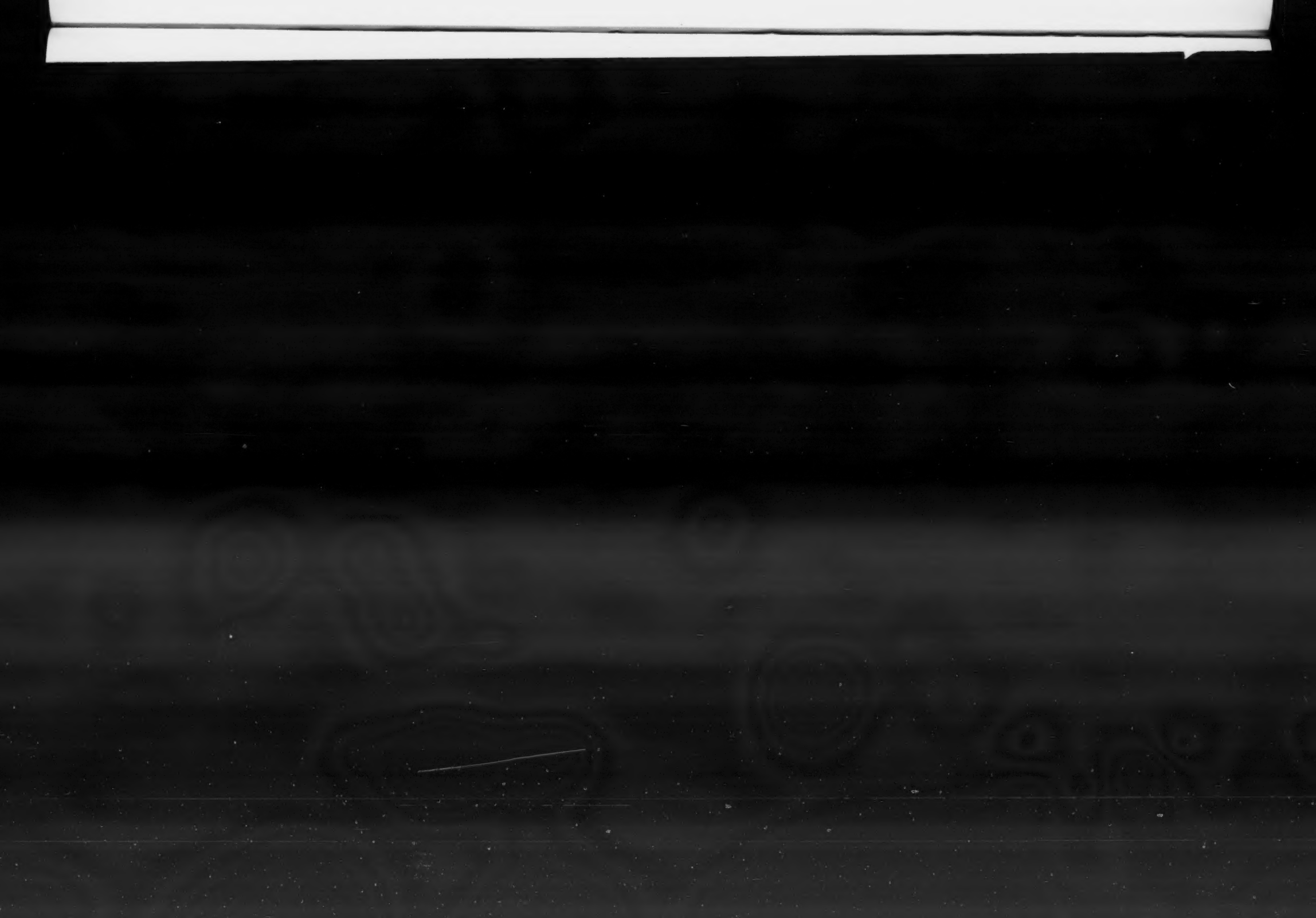
Chapters on highway films available on bibliography and finally on organizations interested in highway development complete the study, with note outlining briefly the activities of the Highway Education Board.



Pennsylvania-Dixie Cement Corp. plant No. 5 at Nazareth, P

Cement Corp. plant No. 5 at Nazareth, Penn.; annual capacity, 1,200,000 bbl.

26, 1930



Tonnages and Costs in One of World's Largest Quarries

THE Bingham Canyon mine of the Utah Copper Co. may be an open-pit mine to mining engineers, but it is a hillside quarry to crushed-stone operators—one of the largest in the world, and comparable in every way with ordinary cement-rock or commercial crushed-stone quarries except in size, modernness and low-cost operation. The following from the annual report of the Utah Copper Co. for the year 1929 should prove interesting to quarry operators:

The overburden excavated and disposed of during 1929 was 9,543,262 cu. yd., increase of 10.53% over any previous year. Stripping operations have from inception covered an area of 386.85 acres, of which 176.01 acres are inside and the balance outside the ore boundary lines.

A record production of 17,724,100 tons of ore was mined and transported to concentrating mills, which represented an increase of 1,165,600 tons over 1928 tonnage.

Central precipitating plant recovered 4,420,460 net lb. of copper at cost of approximately 6.5 cents a pound.

The mining cost per ton of ore milled, including proper apportionment of fixed, general, suspense and stripping charges (not including federal taxes and depreciation) was 41.21 cents a ton. Actual direct mining cost of all ores was 18.77 cents, of which 12.37 cents represents actual mining costs and the balance, or 6.40 cents, fixed and general charges.

Expense of all stripping actually removed during 1929 and an apportionment of similar charges previously deferred, amounting to 22.44 cents per ton of ore mined, was absorbed into mining costs.

Electrification of the mine haulage system was continued during the year by the addition of thirty 85-ton electric locomotives, making a total of 41 now in service. Steam locomotives are now in use at the mine only on some of the upper levels.

At the mills, additional grinding and concentrating facilities were installed to improve metallurgical results at maximum tonnage capacity. Benefit of these betterments is reflected through marked increase of copper recovery, all former plant records for low copper content in the tailings having been bettered since this supplemental equipment was placed in service.

Average copper content of mill feed was 0.994%, or 19.89 lb. a ton, compared with 0.992% and 19.84 lb., respectively, for 1928. Average recovery in the form of concentrates was 85.67%, or 17.04 lb. a ton, compared with 85.56% and 16.97 lb., respectively, for 1928. Average milling cost for 1929 was 36.58 cents a ton, compared with 36.9 cents for 1928, a decrease of 0.32 cents a ton.

During April the mills treated daily average of 61,744 tons of ore and produced 30,229,977 net pounds of copper—new high records for a single month's performance. Maximum tonnage of stripping and ore handled in a 24-hour day during the year was 142,185 wet tons, greatest tonnage of ore mined and moved to the mills over the Bingham and Garfield railway was 75,107 net tons, establishing new records for a 24-hour day. Yearly records were also established in ratio of concentration, per cent copper in concentrate, direct milling costs and locomotive haulage cost at the mine.

South Carolina to Spend $16,000,000 on Highways

CONTRACTS for highway construction to cost approximately $16,000,000 are ready to be let as a result of what was termed the "virtual dismissal" by the Supreme Court of the United States of an appeal involving South Carolina's $65,000,000 bond issue, according to an announcement by the chief highway commissioner, Ben M. Sawyer.

Road and bridge work representing 562 miles of hard surface and 95 miles of earth type roads, together with the necessary bridges, will be done simultaneously in the state's 14 judicial districts, Mr. Sawyer stated. Twelve full survey parties now are in the field.

At the same time Mr. Sawyer announced a list of road and bridge work ready to be let as authorized and directed by the highway commission. The proposed work is to be started almost immediately, he said, and involves practically every city, town and village in the state.

"The state highway commission has not adopted a construction program," Mr. Sawyer stated, "and therefore it is not known the particular roads that will be advertised for the first or early lettings. The construction of connecting links in the hard surface system and the construction of important roads in counties where little or no paving has been done will be given priority in the making of the statewide construction program.

"It will be the purpose of the state highway commission first to provide hard surface connections between the centers of population and necessary trunk lines for through travel. The system will be built simultaneously in the 14 judicial circuits and the work will be let as quickly and orderly as can be done economically.

"The roads which are now ready to let represent 562 miles of hard surface and 95 miles of earth type, together with necessary bridges. The total estimated cost of constructing the roads and bridges now ready to be let to contract is $16,000,000. We now have 12 full survey parties in the field, and the drafting room is operating at full capacity in the preparation of plans.

"The completion of these roads will provide a continuous roadbed of dependable type that will connect practically all of the cities and community centers of the state. Greenville, Spartanburg, Columbia, Charleston, Anderson, Florence and the other cities of the state will be the chief financial beneficiaries of these motor vehicle trunk lines."

Missouri Sand and Gravel Developments

THE Missouri Gravel Co.'s new plant on the state tract near LaGrange, Mo., which has been in the course of construction for the last several months, was put into operation recently. The first material excavated will be used for the floor of the Quincy Memorial bridge.

The Missouri Gravel Co., which has operated a plant here on the river front since 1925, pumping gravel from the bed of the river, has secured a five-year contract to excavate gravel for the state highway commission on the state tract. The new plant cost approximately $100,000 and is one of the most modern gravel producing units in Missouri, or in this section of the country.

The design and construction of the plant is a consolidation of the better methods in the industry for excavating, screening, washing and preparation of sand and gravel. Five different sizes of gravel will be prepared and these can be mixed in any proportion desired. The capacity of the new plant will be from 60 to 70 cars daily. The company will also operate the plant on the river in addition to the new tract on the state land. It is estimated that from 6000 to 8000 car loads of sand and gravel will be shipped from the LaGrange plants this year.

W. F. Howell, of Marion county, who operated a gravel pit for several years, first bought 70 acres of land from G. W. Sturham in 1923, from which he secured the gravel. Mr. Howell later sold this tract and an adjoining 40 acres which he had bought from Mrs. L. C. Scanland, a total of 110 acres, to the state for $300 an acre. The state later acquired 120 more acres, purchasing 80 acres from Morey Bozarth and 40 acres from a man by the name Frieden, the purchase price being $300 an acre.

The Moline Consumers Co., of Moline, Ill., recently purchased the F. T. Odell farm of 268 acres at a price of about $200 an acre. The Odell farm is a part of the tract in the Mississippi bottoms, south of LaGrange, underlaid with an extensive deposit of gravel valuable for road building. This land joins the state tract where Mr. Odell has been getting out gravel for the state highway commission for the last two or three years. The Moline company acquired in addition to the farm the gravel excavating outfit used by Mr. Odell, who will continue to have use of the farm for farming purposes for four years.

The stockholders of the Missouri Gravel Co. are for the most part the stockholders of the Moline Consumers Co.—*Canton* (Mo.) *Record.*

1930 Will See Banner Year in Street Paving

Census of Construction in Larger Cities Taken by Asphalt Institute Shows Steady Gain in Paved Yardage Since 1927

OFFICIAL FIGURES received from a majority of the 88 cities in the United States having a population of 100,000 or more, in a census of city paving being taken by The Asphalt Institute, show that despite the industrial depression that existed last fall, the year 1929 witnessed the construction of approximately 45,000,000 sq. yd., or about 4400 miles of new city pavements of a higher type than waterbound macadam, an increase of about 11% over 1927 and 1928.

The returns show also that a tremendous paved yardage is in prospect for 1930, most of the cities planning greatly expanded programs in accordance with the plan of President Hoover, the Department of Commerce, the municipalities and the construction industries to afford work for the unemployed and "make prosperity permanent." City paving, in the larger cities at least, according to indications, will be from 15 to 20% greater in 1930 than in 1929.

Returns from the paving census show that in 63 cities, or about 75% of those having 100,000 population or more, a total of 32,491,908 sq. yd., or about 3200 miles, of new pavements of a type higher than waterbound macadam were constructed in 1929. Asphalt streets constructed that year totaled 21,633,496 sq. yd., or approximately 2060 miles, while the other types higher than waterbound macadam amounted to 10,858,412 sq. yd., or approximately 1160 miles.

On this basis the 88 cities in the United States having 100,000 or more population, constructed, in 1929, 45,290,000 sq. yd. of new streets, or, roughly, 4400 miles of pavement 18 ft. wide. In 1929, the eleven largest cities in the United States, Boston, New York, Buffalo, Philadelphia, Pittsburgh, Chicago, Detroit, Cleveland, St. Louis, Baltimore and Los Angeles, constructed a total of 18,322,608 sq. yd., or approximately 1700 miles of high type pavement, of which 11,617,624 sq. yd., or 1050 miles, were of asphalt and 6,704,984 sq. yd., or 650 miles, were of other types. In 1927 these same cities constructed a total of 13,027,958 sq. yd., or approximately 1200 miles, of new streets. Of this, a total of 9,121,525 sq. yd., or 900 miles, were of asphalt and 3,906,433 sq. yd., or 300 miles, were of other types.

For 1930 cities in the Middle Atlantic states will lay approximately 12% more pavement than in 1929. Those in the East-South-Central states will increase their yardage by at least 4%. Cities in the West-South-Central states will show an increased construction of about 58%. Construction in New England, South-Atlantic, East-North-Central and Pacific-Coast cities will but slightly exceed that of 1929 in some cases, and in others will equal the improvements last year.

Where Paving Is to Be Done

Among the cities contemplating the construction of increased yardage of paved streets this year, as officially reported by their street departments, are: Birmingham, Ala., 250,000 sq. yd. of asphalt, 22,000 sq. yd. of brick and 75,000 sq. yd. of concrete; Boston, Mass., 250,000 sq. yd. of asphalt and 90,000 sq. yd. of stone block; Cleveland, O., 340,000 sq. yd. of asphalt, 250,000 sq. yd. of brick, 30,000 sq. yd. of concrete and 10,000 sq. yd. of stone block; Columbus, O., 200,000 sq. yd. of asphalt, 30,000 sq. yd. of brick and 20,000 sq. yd. of concrete; Dallas, Tex., 265,000 sq. yd. of asphaltic, or bituminous, types and 60,000 sq. yd. of brick; Dayton, O., 22,500 sq. yd. of brick and 31,080 sq. yd. of concrete; Elizabeth, N. J., 100,000 sq. yd. of asphalt; Ft. Wayne, Ind., 92,000 sq. yd. of asphalt; Grand Rapids, Mich., 50,000 sq. yd. of asphalt and 25,000 sq. yd. of concrete; Jacksonville, Fla., 28,577 sq. yd. of asphalt, 18,750 sq. yd. of brick and 18,930 sq. yd. of concrete; Kansas City, Kan., 90,000 sq. yd. of asphalt, 65,000 sq. yd. of brick and 75,000 sq. yd. of concrete; Knoxville, Tenn., 50,000 sq. yd. of asphalt and 50,000 sq. yd. of concrete; Newark, N. J., 150,000 sq. yd. of asphalt and 500 sq. yd. of stone block; Philadelphia, Penn., 2,550,000 sq. yd. of asphaltic, or bituminous, types, 100,000 sq. yd. of brick, 125,000 sq. yd. of concrete and 15,000 sq. yd. of stone block; Flint, Mich., 250,000 sq. yd. of asphalt; Richmond, Va., 73,000 sq. yd. of asphalt, 38,000 sq. yd. of brick, 5000 sq. yd. of concrete and 26,000 sq. yd. of stone block; Scranton, Penn., 30,000 sq. yd. of asphalt, 15,000 sq. yd. of concrete and 2000 sq. yd. of stone block; St. Paul, Minn., 130,935 sq. yd. of asphalt, 69,632 sq. yd. of brick and 110,507 sq. yd. of concrete; Syracuse, N. Y., 200,000 sq. yd. of asphalt and 10,000 sq. yd. of brick; Tulsa, Okla., 55,000 sq. yd. of asphalt, and Wilmington, Del., 60,000 sq. yd. of asphalt.

Iowa Contractor to Fight A. G. C.'s Scheme to Improve Contracting

THE Associated General Contractors of America have a court fight on their hands in Iowa to defend their attempt to restrict the contracting industry to "responsible" concerns, largely of their own selection. Alleging a "monster combine" to monopolize Iowa's state paving program, the Larkin Construction Co. recently instituted suit at Des Moines, Iowa, for $500,000 actual damages and $950,000 exemplary damages against 10 companies which it claimed had "practically destroyed" its business. The suit sets forth that last December the Larkin company refused to enter an agreement with the defendant concerns to destroy free competition and that in March, after the Larkin company had been awarded a state paving contract, the defendants "caused to be circulated" through the Bureau of Contract Information, Washington, D. C., which is one of the defendants, "false representation on the honesty, integrity and financial responsibility" of the company, making it impossible to procure the necessary contract bonds, without which it could not proceed with the improvement for which it held contract.

Defendants are: Associated General Contractors, Des Moines, and its head, O. W. Crowley; Bureau of Contract Information, Washington, D. C.; Bryant Paving Corp., Waterloo; Concrete Materials Corp., Waterloo, and Harry Bellamy, C. E. Oldham and Frank W. Wright, associated with it; Capital Construction Co., Des Moines, and Charles W. Wagner, president and treasurer; Hawkeye Portland Cement Co., Harrison, Iowa; Engineering Construction Co., Omaha, Neb.; Klauer Manufacturing Co., Dubuque; C. F. Lytle Paving Co., Sioux City; O'Rourke Construction Co., Des Moines; Southern Surety Co., New York, and Keith Merrill, Des Moines surety and insurance agent.

Warner Co. Gets Big Contract

THE Warner Co., Philadelphia, Penn., has been awarded a contract to furnish all the sand and gravel to be used in the construction of the large dam to be built by the city of Wilmington, Del., as a part of the new water-supply project for the city. Deliveries will begin early in May and are to be maintained at a daily rate of 1000 tons.

Foreign News Notes

SIX large Danish cement plants within the range of interests of F. L. Smidth and Co. have established a central sales office in Copenhagen under the name Dansk Cement Centrale, representing the greater portion of the Danish cement industry and excluding two large plants.

A new cement plant is being erected near Vellereille-le-Sec in Flanders by the Cannon-Brand Artificial Portland Cement Works, Ltd., of Antwerpen, a Belgian concern.

The Wicking Portland-Cement und Wasserkalkwerke A.-G. in Muenster i. W., Germany, has started initial preparations for the erection of a plant for producing bauxite cement.

A new cement plant is intended to be built by the Concordia Portlandzement und Kalkwerke A.-G., Nienburg (Saale), Germany.

The Greek concession company Barlos has made agreements with German concerns for the opening up of the Greek bauxite deposits in Distomon on the Corinthian Bay.

General Contractors' Association Has Unique Form of Management

THE INNOVATION in trade association management adopted by the Associated General Contractors of America at its recent eleventh annual convention ought to be of considerable interest to other trade organizations. Since January 23, 1930, that national organization of contractors has been managed by a president's cabinet functioning similarly to a commission form of city administration but with collective responsibility. Each member of the cabinet is engaged in a different line of construction activity such as building, highway, railroad and public works and each operates in a different section of the United States.

Operating under authority of the executive board of the association, this president's cabinet of the A. G. C., is composed of the president and four such outstanding contractor members as are willing, for the welfare of the association, to assume the responsibility of managing the organization, outline programs and meet frequently to pass on all matters of importance that concern the association's work or finances.

Further, under the plan, the cabinet members place themselves at the service of the association in attending conference with those agencies where contacts are important, in making representations on behalf of the association and in individually traveling and promoting the various programs under way.

The audacious feature of the innovation lies in expecting that busy executives will think sufficiently well of their association and the importance of its program to give repeatedly of their time and attention without other compensation than the results they bring about. Yet this appears to be the kind of service which the A. G. C. is counting on and which it is receiving from executives who would nominally be considered too busy to devote themselves to such a strenuous endeavor. The old saying, "If you want something done quickly and well, place it in the hands of someone who is too busy to do it," appears to have been taken literally by organized contractors.

The mechanics of administration under this plan may be likened to that of a city having the commission form of government and manager. Under the managing cabinet, the Associated General Contractors provide an executive with the title of assistant general manager, who heads up the staff of the association and advises with and carries out the decisions of the cabinet. Under the assistant general manager the staff is departmentalized, providing a clear cut allocation of responsibility while retaining the unity which makes for co-ordination.

The contractor's association realizes that the procedure being followed is experimental. Its advantages have already become manifest in that more immediate attention is given to representations of a group of business executives of national standing than would be the case ordinarily should a paid executive make the same representations. Further the responsibility assumed by the cabinet members and the discharge of their functions requires that they be more thoroughly familiar with the details of the programs which they have in charge and enables them to speak more effectively than would a delegation gathered at short notice from among the membership.

The executives who are playing leading parts in this development of co-operative management are: President A. E. Horst, Henry W. Horst Co., Rock Island, Ill., and Philadelphia, Penn.; Col. George B. Walbridge, Walbridge, Aldinger Co., Detroit, Michigan; Frederick L. Cranford, Frederick L. Cranford, Inc., Brooklyn, N. Y.; Alan Jay Parrish, Alan Jay Parrish Co., Paris, Ill., and W. A. Bechtel, W. A. Bechtel Co., San Francisco, Cal. E. J. Harding, Washington, D. C., is assistant general manager of the association, heading up the activities of the staff.

Crushed Stone Statistics

THE 1928 statistics on stone have just been published by the United States Bureau of Mines. Most of the statistics have to do with stone in general, classified according to the kind or variety of stone. This lumps various quarrying operations of entirely different characters and purposes and consequently much of the statistics of quanties and values are rather meaningless. For example, only one table contains any statistics in regard to the number of operations—2704 being the total, but this number includes an unknown number of dimension stone quarries, quarries producing curb stone, flag stone, rubble, etc. The total also includes numerous but an unknown number of wayside quarries, temporary operations, etc., of railways, highway departments, etc. The result is that the statistics give no clew to those interested in various kinds of quarry operation—which require various and distinct kinds of machinery and equipment—as to how many plants there are in which they might have an interest. Such statistics are much needed.

Probably the number of commercial crushed stone operations does not exceed 600 or 700, but one would search in vain for such information in this report. The Bureau of Mines has, however, at last reported crushed stone statistics of production and value from other stone industry statistics, which is a beginning.

The crushed stone having the highest value, according to these statistics, is granite, the average value of which varied from $1.67 per ton, f.o.b. plant, in 1928, in the Eastern States, to 80c in the Western States. Except in the Western States it was rated as worth more than any other kind of crushed stone. The value of basalt (trap rock) varied from $1.30 per ton (average) in the eastern states, to $1.06 in the western states. Limestone was worth on an average $1.23 per ton in the East and 68c per ton in the West.

These values are interesting and are proof that cost of producing crushed stone, which is more for the harder, tougher varieties, is reflected directly in the prices received. Prices of all aggregates, according to government statistics, have been consistently lower on the West Coast than anywhere else in the country. Prices in the South, $1.23 for granite, $1.10 for trap rock, and 82c for limestone, in 1928, were lower than in the East and Central West. Prices in the Central West were appreciably lower than prices in the East.

Washington State Gravel Company Expands

IN PREPARATION for the extensive road work and building construction planned in all parts of southwest Washington, the Lewis County Gravel Co., whose plant is located north of Centralia, Wash., Waunch Prairie and Fords Prairie, is undergoing much rebuilding, and new gravel washing machinery will soon be in place. Several new wells are being drilled to meet the increased needs for water. Larger crushing machinery is being installed. The plant soon expects to enter the ready-mixed concrete business to meet the latest demands in building construction. The work is being directed by G. A. Nelson and Clarence Ives, both Centralia men of prominence who have leased the plant from Frank Knowles for a short term of years. The new owners took possession March 1. Mr. Knowles plans to leave for Eagle, Alaska, where he will engage in engineering work for a short time.—*Centralia* (Wash.) *Tribune.*

Large Blast at Quarry in Connecticut

SEVEN TONS of dynamite were used in a blast at the quarry of the Bertolini Trap Rock Co., Trumbull, Conn., near Bridgeport, April 12. The blast brought down 100,000 tons of rock.

A tunnel, which was loaded with dynamite, was drilled 60 ft. into the rock, with two side tunnels each being 50 ft. in length. It took more than a month to drill the tunnel into the solid rock and nearly three days were needed to load it with dynamite.

The dynamite was placed in 6 pockets 15 ft. apart, one ton in each pocket. Then 15 snakeholes were drilled in the face of the quarry and 100 lb. of dynamite placed in each hole. The snakeholes were connected with the main charge by electric blasting caps. The work was supervised by S. A. Johnson, explosive engineer of the Hercules Powder Co., New York.—*Stamford* (Conn.) *Advocate.*

The Census of Mines and Quarries

IN AN EFFORT to expedite and improve its complications, the Bureau of the Census is urging all operators to fill out their questionnaires accurately and promptly in the current Census of Mines and Quarries. This census, which is one of the series of decennial censuses extending back more than three-quarters of a century, is being conducted so far as possible by mail, and each operator is asked to return his report within 15 days after receiving the form.

An unusual effort is being put forth to take this census more promptly and accurately than any prior census has been taken. Since the benefits of the census come chiefly to the mine and quarry operators themselves, they are being depended upon to assist in the endeavor through whole-hearted co-operation, and the results depend on the care and promptness with which every mine or quarry operator fills out the questionnaires.

Answers to the questions are required by law, but the Bureau of the Census is compelled to hold all information in strict confidence, even from other departments of the Government. The information can NOT be used in the assessing of taxes of any kind. Furthermore, the data gathered will be published in such form that individual operations will NOT be revealed. Each mine and quarry operator will become merely a unit of a group of such operators of a given classification.

The only classes of rock products producers not covered by the census are the following: :

Establishments which were closed or idle during 1929 and those which were abandoned or dismantled prior to January 1, 1929; establishments whose annual output was valued at less than $2,500 or in which the amount spent on development work during 1929 was less than $2500. The other exceptions relate to nonmetallic industries such as coal and oil.

Cut Prices to Promote Construction?

LOWER PRICES for gravel prevail this year than for several years past, because of the apparent slump in paving operations. Sand and gravel dealers admit they have cut the price in the hope of stimulating business, but point out that the result is an opportunity to get paving done at a lower cost than is likely to prevail after the coming season is over —*Salem* (Ore.) *Statesman.*

Recent Contract Prices

SALEM, ORE.—The Marion county court has awarded the contract for furnishing 15,000 cu. yd. of crushed gravel in bunkers near Fairfield to Oregon Gravel Co. of Salem, on its bid of 49c per cu. yd., or a total of $7350.

PORTLAND, ORE.—Contract for 5000 bbl. of cement was awarded to the Oregon Portland Cement Co. by the city of Portland at $2.80 per bbl. No bids were received on foreign cement.

LOUISVILLE, KY.—The Nugent Sand Co., Louisville, Ky., was awarded the contract for sand and gravel for the city during the remainder of the fiscal year, which ends August 31, at a letting recently by George W. Stege, city buyer. The price was 80c a ton on gravel and 85c on sand.

Eleven bids on cement for the same period developed the fact that all of the bids were exactly the same price. The price also is slightly higher than last year, $2.17 per bbl. in paper and $2.52 in cloth, f.o.b. cars or $2.52 and $2.77 delivered.—*Louisville* (Ky.) *Courier-Journal.*

Montana Gravel Plant Expects Good Year

THE Chinook, Mont., gravel pit is being prepared for a heavy season's run. Harry Shiere, superintendent of the plant for the past several seasons, arrived from Minnesota recently, and has a force of men already employed in preliminary work, getting the plant in shape for the season and laying plans for improvements to be made.

The largest improvement will be the electrification of the haulage system. A narrow-gage railway line from the pit to the washer will be operated by electric power this year for the first time, completing the electrification of the entire plant. Considerable new material for the work has arrived, some of which was used at the Cascade tunnel of the Great Northern railway in Washington. Repair work and improvements are expected to be completed in three or four weeks.

The washing plant, which is operated by the J. L. Shiely Co., St. Paul, Minn., will turn out a large amount of sand and gravel for railroad ballast and construction work, much of it going east of here to the North Dakota line. Gravel for the Wolf Point bridge will be supplied from the Chinook plant, which will require a heavy tonnage.

The plant operated with a crew of 25 men last season, but orders now in sight indicate it may be necessary to double that force or operate with two shifts.—*Havre* (Mont.) *Daily News.*

Retail Prices of Various Rock Products Materials

THE TABLE below gives average prices paid March 1, 1930, by contractors for various rock products, delivered on the job at different principal cities of the United States. These prices were secured through the Bureau of Census.

AVERAGE RETAIL PRICES FOR ROCK PRODUCTS MATERIALS, MARCH 1, 1930

City	MATERIAL					
	Portland cement, per bbl. excl. of cont.	Gypsum wallboard, ⅜-in., per M	Hydrated lime, per ton	Building sand, per cu. yd.	Crushed stone, ¾-in., per ton	Gypsum plaster, neat, per ton
New Haven, Conn.	$2.80	.....	$20.00	$1.50	$2.25	.....
New London, Conn.	3.00	$25.00	26.00	1.50	2.40	$18.00
Waterbury, Conn.	3.00	30.00	20.00	1.35	2.45	20.00
New Bedford, Mass.	2.80	25.00	23.00	1.75	3.00	17.50
Haverhill, Mass.	2.80	27.50	20.00	1.75	.....	18.75
Poughkeepsie, N. Y.	2.04	.....	.....	2.25	2.20	.....
Albany, N. Y.	2.97	24.75	18.00	.....	.....	17.10
Rochester, N. Y.	2.85	22.00	22.00	2.50	2.40	17.00
Syracuse, N. Y.	3.00	22.50	26.00	2.00	2.00	17.00
Buffalo, N. Y.	3.10	25.00	18.00	2.50	2.05	14.00
Paterson, N. J.	2.60	26.00	18.00	1.50	2.10	17.50
Trenton, N. J.	2.40	26.00	18.00	1.50	2.10	17.50
Scranton, Penn.	2.80	.....	20.00	3.25	.....	19.00
Philadelphia, Penn.	2.30	.....	15.50	1.75	2.40	19.75
Baltimore, Md.	2.75	.....	13.00	2.00	2.75	16.00
Washington, D. C.	2.65	25.00	14.00	.....	.....	17.00
Richmond, Va.	3.10	31.00	17.50	1.95	2.45	20.00
Fairmount, W. Va.	2.80	35.00	16.00	3.15	3.50	18.00
Winston-Salem, N. C.	2.59	.....	14.00	2.50	4.50	17.00
Atlanta, Ga.	2.85	.....	15.00	2.50	3.00	16.50
Savannah, Ga.	2.25	25.00	20.00	2.00	5.50	16.00
Louisville, Ky.	2.52	.....	15.50	.....	2.[illegible]	16.00
Tampa, Fla.	2.40	.....	24.00	2.00	4.25	22.50
Shreveport, La.	3.20	.....	22.50	2.00	4.75	22.00
Birmingham, Ala.	3.00	.....	.....	3.00	2.50	16.00

City	MATERIAL					
	Portland cement, per bbl. excl. of cont.	Gypsum wallboard, ⅜-in., per M	Hydrated lime, per ton	Building sand, per cu. yd.	Crushed stone, ¾-in., per ton	Gypsum plaster, neat, per ton
Erie, Penn.	$2.60	.....	$19.00	$2.25	.....	$16.00
Akron, Ohio	2.57	.....	18.00	2.50	$3.00	18.00
Columbus, Ohio	2.75	$23.00	17.50	2.25	2.50	15.00
Toledo, Ohio	.....	22.50	20.00	3.04	2.50	18.00
Cincinnati, Ohio	2.96	25.00	16.40	2.63	2.55	.....
Cleveland, Ohio	2.68	22.00	16.00	2.09	3.65	15.50
Youngstown, Ohio	2.95	.....	20.00	3.71	2.75	.....
Detroit, Mich.	2.60	21.00	14.80	2.75	3.00	.....
Saginaw, Mich.	2.40	25.00	18.00	2.50	3.25	17.00
Terre Haute, Ind.	3.00	28.00	18.00	1.65	3.50	20.00
Chicago, Ill.	2.05	.....	17.00	1.75	1.52	15.00
Milwaukee, Wis.	2.60	25.00	.....	2.00	2.00	18.00
Lansing, Mich.	2.75	.....	22.00	2.25	2.25	16.00
Des Moines, Iowa	2.66	23.75	20.00	1.60	3.60	.....
St. Louis, Mo.	2.60	.....	18.00	2.70	1.90	17.00
Kansas City, Mo.	2.40	25.00	23.00	2.00	1.87	15.00
St. Paul, Minn.	2.60	25.00	21.00	1.40	2.00	16.00
Sioux City, Iowa	2.80	27.00	26.00	1.50	2.25	16.00
Denver, Colo.	3.20	40.00	23.00	1.25	1.15	18.00
Grand Forks, N. D.	2.80	25.00	.....	2.60	.....	16.00
San Antonio, Tex.	2.82	37.00	20.00	2.10	2.35	18.15
Tucson, Ariz.	3.07	40.00	30.00	1.25	2.25	19.00
Los Angeles, Calif.	1.72	34.00	24.00	2.43	1.30	17.50
San Francisco, Calif.	2.60	.....	22.50	1.40	1.60	20.00
Seattle, Wash.	1.90	35.00	22.00	1.25	.....	20.00

The Albany regional safety meeting held at the Ten Eyck Hotel

Eastern New York, New England and Canada Cement Mills Talk Safety at Albany

ONE OF THE LARGEST cement safety meetings of the year was held at the Ten Eyck hotel in Albany on Tuesday, April 15, the attendance of about 125 representing all twelve cement mills located in eastern New York, New England and eastern Canada.

F. P. Monaghan, works manager of the Glens Falls Portland Cement Co., acted as chairman and was assisted by a local committee consisting of Arch Brown, superintendent, Alpha Portland Cement Co., Cementon, N. Y.; E. L. Boyne, superintendent, Alpha Portland Cement Co., Jamesville, N. Y.; R. A. Dittman, superintendent, Universal Atlas Cement Co., Hudson, N. Y.; E. E. French, superintendent, Canada Cement Co., Hull, Que.; A. G. Beck, superintendent, Canada Cement Co., Montreal, Que.; J. A. Creasor, general manager, National Cement Co., Montreal, Que.; A. L. Wolf, superintendent, Lawrence Portland Cement Co., Thomaston, Maine; C. S. Andres, superintendent, Lone Star Cement Co. of New York, Hudson, N. Y.; H. F. Kichline, superintendent, North American Cement Corp., Catskill, N. Y.; S. H. Rhodes, North American Cement Corp., Howes Cave, N. Y.; Ernest Snyder, superintendent, Lehigh Portland Cement Co., Alsen, N. Y., and F. P. Werner, superintendent, Pennsylvania-Dixie Cement Corp., Portland Point, N. Y.

James C. Gheen, executive secretary of the Albany Chamber of Commerce, gave the meeting its central theme in his address at the luncheon, in which he said in part:

"Business operations, happily, have progressed beyond the point where they depend, as of old, on luck and pluck—meaning if one has luck he can pluck another—in other words, a regime in which each individual had to look out for himself. Today all that is changed and we are progressing through an era of practical co-operation.

"Under these favorable auspices success is attained with certainty by the application of five basic rules which I have been fortunate enough to find in the writings of a famous logician. They are as follows:

"(1) Know what you want, absolutely and positively.

"(2) You must want it badly enough.

F. P. Monaghan, Glens Falls Portland Cement Co., chairman of the meeting

"(3) It must be persistently pursued in preference to everything else.

"(4) You must expect to gain it—your unshaken confidence is one of the greatest factors in succeeding.

"(5) There must be no hesitancy to sacrifice as need be to attain it.

"In safety work as in other endeavors many people make the grievous mistake of concentrating on the wish to succeed before they undertake a thorough and painstaking analysis of the problem they hope to solve. Rudyard Kipling has splendily advised us to analyze the problem in order to find out of just *what* it consists, *why* it is a problem and *why* it persists, *where* the trouble is, and *who* is involved. Solve the what, why, where and who of the matter and you will be able to master it like the fellow of whom it was written: 'People said it couldn't be done but he, poor fool, didn't know it, so he went out and did it.'"

History of Cement Association's Trophy

President Frederick W. Kelley, of the North American Cement Corp., was luncheon chairman, making his first public appearance since a recent illness. Mr. Kelley recounted the story of the inception and design of the Portland Cement Association's safety trophy, the rapid growth in the number of annual awards and of the influence of the trophy on the reduction of accidents.

"The first idea entertained by our committee," said Mr. Kelley, "was to award a bronze tablet. Characteristic of our industry, however, the committee entertained the hope that the trophy could be made of concrete. In achieving this end we were assisted by Robert F. Havlik, then instructor and builder at Mooseheart, who worked out our ideas in concrete.

"The first trophies weighed between 15,000 and 16,000 lb. and were made of what was considered good concrete. Later the trophies were cored, reducing the weight to about 11,000 lb., and using a somewhat stronger concrete. This year I am told the trophies, which will be of the same exterior dimensions, will be cored still further, reducing the weight to about 5,700 lb. and substituting for the former marble mixtures a granite mixture giving a compressive strength of 16,000 to 18,000 lb. per sq. in. The reductions in the weight of the trophy and consequent freight savings are possible because of the knowledge acquired through the Portland Cement Association's research work. It is an interesting example of the savings which that research has made possible in the various fields of concrete construction by stepping up strength and economizing on weight."

The program of the morning and afternoon sessions was as follows:

MORNING SESSION

Report on Safety Work in Cement Industry in 1919, A. J. R. Curtis, Portland Cement Association.

Good Housekeeping as an Aid to Safety, G. A. Hummel, Power Department, Lone Star Cement Co., Hudson, N. Y.

What Kind of a Safety Talk Should a Foreman Give His Men? R. B. Fortuin, Assistant to General Manager, Pennsylvania-Dixie Cement Corp., Nazareth, Penn.

Weather Hazards and Their Control, John Dempster, Canada Cement Co., Ltd., Port Colborne, Ontario, Canada.

AFTERNOON SESSION

Rehabilitation, James A. Pisarri, District Director, New York State Bureau of Rehabilitation.

First Aid Contest under the direction of M. J. Ankeny, senior foreman of mines, U. S. Bureau of Mines.

Teams: Glens Falls Portland Cement Co., North American Cement Co., Catskill; North American Cement Co., Howes Cave; Lone Star Cement Co. of New York, Hudson.

Good Housekeeping Wins Warm Approval

G. A. Hummel of the power department of the Lone Star Cement Co., New York, read a paper, in part, as follows (prepared by the International Cement Corp.), at the morning session:

"Our home and the plant, in which we are employed, are closely related. Both may be called home, for is not your association with our shopmates as long as with our families during the course of a day? Do not our home life and plant life reflect upon each other? Would it be unreasonable to assume that the environment at our work would balance our home environment in molding or changing our character? Would housekeeping at the plant be a criterion of our housekeeping at home, or vice versa?

"The housekeeper of our home we always think of as our wife or our mother. Who is the housekeeper at our other home? We are, you and I, with our department, our mill, kiln, work bench, or what not as the

Frederick W. Kelley, North American Cement Corp., luncheon chairman

scene of our housekeeping. Do we want the conditions at the plant to be the same as at home? Do we want our families at home exposed to the same dangers as we are at the plant; or, are we going to be the same good housekeepers as our wives and mothers? Did your mother expose you to bodily injury or bodily ills by her methods of housekeeping, or did housekeeping and safety go hand in hand?

"Let each one of us imagine for a while that our name is Bill Jones and we tell a little story that goes something like this. I, Bill Jones, am an employe of So and So Cement Co., which has a slogan for its employes, 'Anything Goes, Only Make Cement.' I considered my job a good one and on the strength of an expected or unexpected increase in pay I decided to move my family to a new house. I chose a prospective place, located the owner and had him as a guide for my inspection. As he pointed out the features of this house I was impressed with the close resemblance to my home at the plant and recalled certain incidents.

G. A. Hummel, Lone Star Cement Co., who read a paper on "Good Housekeeping"

"My prospective landlord explained that as the yard around a house was of minor importance, I gave the 'grass-less,' 'walk-less,' rubbish-littered surroundings only a casual glance. At the plant we do not have lawns or walks. Paper and rubbish are not near so noticeable on dirt as on grass and the boys soon learn to walk in the mud without slipping. Why, in the last two months, I'll bet, there hasn't been over three fellows injured from slipping!

"Showing me the cellar, the landlord remarked that it only leaked when it rained, that the heater was cracked but otherwise everything was o. k. Of course, at the plant the drainage isn't so good, but there are plenty of boards on which to stand, and when sprinkled with sand are absolutely non-skid. Yes, we generally have two or three colds during the winter, but last winter I only lost three weeks. I assured him that the cellar would be all right, but then on second thought, if we have a couple of weeks of rain—oh, well, the kids like to swim—guess I'll have to buy Junior that pair of water wings now. Still, I would like to have a light here in the cellar—we have lots of candles, though, and if you are careful you could find a gas leak. I wonder how they are coming along with that new roof on the coal mill at the plant. Can you imagine a guy so dumb as to light a match to see if the coal bins were full?

"I inspected the kitchen next and I noted the gas stove did not have a drip pan under the burners, and the grease had formed some of the most beautiful designs on the linoleum that you ever saw. There was one that looked just like a horse's head. It is too bad those bearing foundations at the plant are so black with oil, or maybe we could see some pictures there. The puddles on the floor are covered with dust so quickly they do not get time to form horses' heads or something like that. I don't know what kind of a design I stepped on the other day, but I sure did wrench my back.

"No, Mr. Owner, I do not want a hood over the stove to carry away the gases and odors. It would just be something else to go wrong. We don't have such things at the plant although the air is pretty thick at times, but we just cut our breathing in half when it gets too heavy. I heard that a cement plant out West installed dust collectors as a safeguard for their workmen's health—they should get some real men to work there, as we have at our plant.

"Yes, those dish closets are pretty small, but I think with a little study we would be

able to pile all of our dishes and pans in them. You know, I am a past master in piling at the plant—the sky is the limit when we pile. Sometimes the piles are a little wobbly, but a 2 by 4 does the trick. Poor Jim Smith had hard luck, though. He was stepping over one of these braces and he didn't step high enough. I never saw so many flowers at one funeral.

"The rest of the down-stairs rooms were just to my liking. The wall paper was dark, wouldn't show the dirt. Of course, it would require a light to read but we have the lights burning all day at the plant. Only about half of the boys wear glasses.

"The windows were a little dirty but if they become too bad, I'll knock them out—that lets in plenty of good fresh air, and in the winter time a piece of cardboard does the trick. That's what we do at the plant. Another thing about those windows, they were the good old fashioned kind, none of those fancy chain and hook window weight kind, but those with the notched stick. They are positive, if you are careful, although the baby did knock the stick out over where we live now, but my wife was right there. Iodine sure is a handy thing to have around the house.

"The lights were very handy, a string hanging down from the ceiling and all you had to do was pull the string. A couple of them sparked a little when I tried them, but the kids will like that. They are just crazy about fireworks. I don't imagine it would take long before you could find the string in the dark without falling over a thing. Of course, the kids while looking for the string will have to watch out for twenty-penny nails supporting calendars on the wall. Those nails, by the way, will make a fine place to hang your hat and coat. If they intend to work over at the plant when they grow up it will be good experience to them. We old timers can find our way around that plant with our eyes closed; still in some places it would be useless to open them.

R. B. Fortuin, Pennsylvania-Dixie Cement Corp., discussed foreman's safety responsibility

There was a new fellow working there who did not know there was a belt drive in one of those dark places—we took up a collection for his widow.

"In walking through the rooms, the owner tripped over a loose board and right then and there I could see where my experience at the plant was worth something. We get fine training in stepping over obstacles. I tried to impress our training upon him by describing our quarry, the floor littered with stones, with the boys nimbly hopping from one to another in hurrying away from rolling stones and blasts.

"I was told, while going up the stairs, that the part of the railing that was missing would be replaced. I assured him it was not necessary—the wife would not use the stairs over thirty times a day, and I would caution the kids. Ladders are better than stairs, anyway, and they don't require a railing.

"The roof was in fine condition, only a few loose slates, and I'll bet they would stay there for a long time. Just like at the plant, there are some loose roofing sheets that I thought would blow off three years ago, but they are still there. Of course, we watch them closely when we are nearby, so I'll just tell the kids to do the same. If the slates blow off maybe it will be a bill collector or the mother-in-law in their path, so why worry.

"Well, to make it short, I moved and nothing has happened, yet.

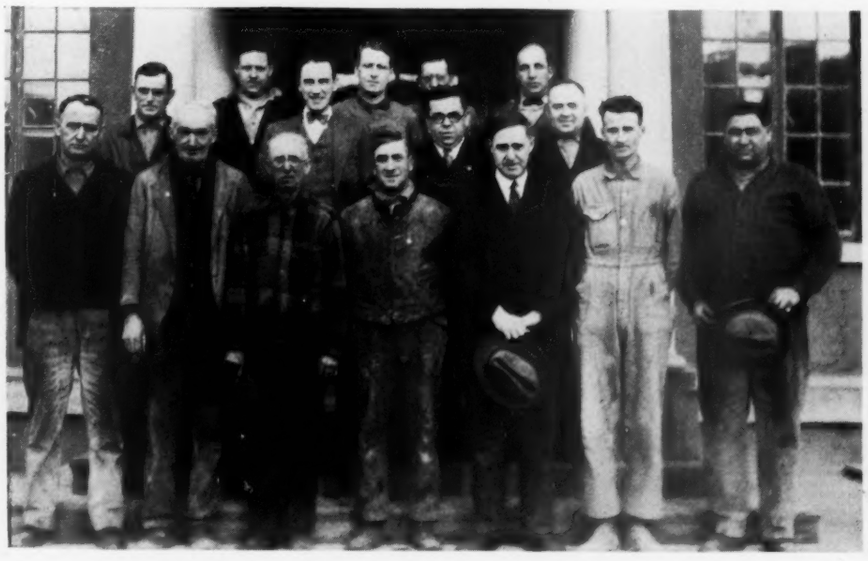
"Does that description apply to your home or to your plant? Is that where you would want your family to live? Is that where your family would want you to work?"

What Kind of a Safety Talk Should the Foreman Give to His Men?

R. B. Fortuin's paper on the above subject was in part as follows:

"In Chicago last fall at the National Safety Congress considerable discussion took place regarding the importance and place of the foreman in the organization. It is an established practice in the cement industry to regard the foreman as a keyman in the plant organization and, as in any other manufacturing industry, production depends upon the quality of supervision exercised by the chief executives and the minor executives, or foremen, as we know them. Any man who is responsible for the operation and production of any department of a manufacturing plant should be considered a minor executive. How important is the foreman in your organization and to what extent do you delegate responsibility and authority to him? Is he just one step better than a laborer or, on the other hand, is he the man who transmits the orders and thoughts of the management to the men under him? Is he the man who instills loyalty into old and new employes? Is he the man who plans the work for his department and sees to it that each man under him is properly instructed in the correct method of carrying on the work? Is he the man who points out the hazards of the day's work to his men and instructs them in methods which will avoid injury?

"In order to be responsible for the safety of the men in his department the foreman should have full authority over them. Responsibility and authority go hand in hand



The Safety Committee of the Lone Star Cement Co., New York. First row, left to right, A. G. Millheim, W. O. Griffith, C. Reynolds, J. Shumsky, E. D. Godshalk, C. Howard, J. B. Howie; second row, C. Keyser, A. F. Flatley, C. S. Andres, superintendent, W. Lester; third row, E. Johns, C. J. Speich, G. Washburn and L. Bonneson

and cannot be separated without sacrificing the respect of the man for the foreman. For example, in one organization I know of a foreman who was reprimanding an employe, who in turn objected. The foreman replied by saying, 'All right, Mike, either do as I say or get out.' The employe replied, 'I see superintendent; he put back on job.' Obviously, there is no co-ordination of authority between the superintendent and foreman and the respect of the workman was lost.

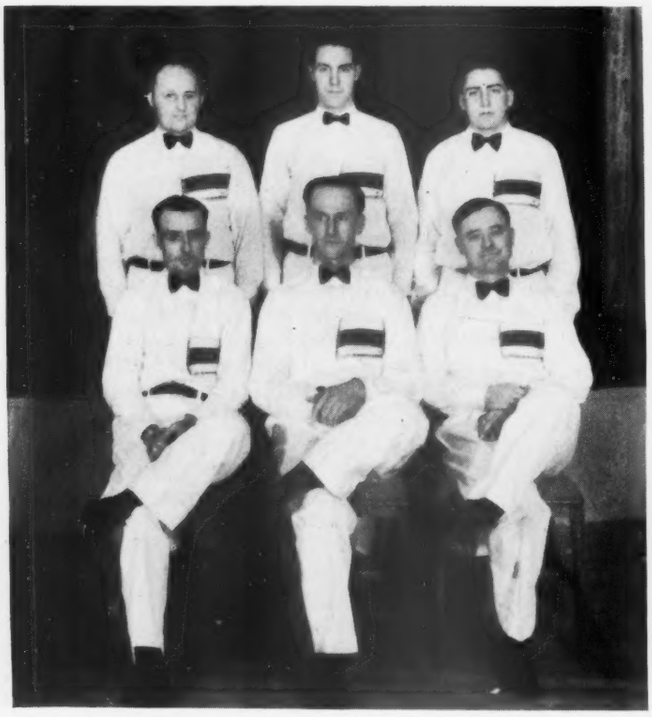
"If a workman under the foreman does not carry out and obey the rules and regulations of the plant he is either a poor workman or has not been properly educated and instructed by his foreman, but if he has been so instructed and refuses to co-operate he is undoubtedly a poor workman and consequently should be dropped from the organization. On the other hand, if the workman refuses to obey the instructions and regulations and will not adhere to the safe practices of the plant and the foreman permits the workman 'to get away with it,' as one might say, he is a poor foreman. Again, he may be a poor foreman because he has not been properly educated and instructed by his superior, the superintendent. However, if the foreman has been properly educated and instructed and permits the men under him to get away with bad practices he is a poor foreman and should be discharged. If the superintendent knowingly permits the foreman to have this type of workman under him, and he knows the foreman allows his men to work other than in accordance with the rules and regulations, he is a poor superintendent.

"Therefore, in looking at our organization set-up we may be all wrong from the bottom up or the top down. The proposition should be put squarely up to the superintendent, as he is the one man responsible for the operation and production of the plant. He in turn should put the efficient and safe operation and production of every department squarely up to the foreman in charge of that department. The opinion today is that the foreman is directly responsible for the actions of each man in his charge.

"The work in safety and accident prevention was set up originally as a separate department in the organization, separate and distinct from any other department or division of the industry, even to the operating department. In the course of time it became very easy to pass the buck, as it were, when anything went wrong, and there were any minor differences, from the operating department to the safety and welfare department, or safety department, as it is known in different organizations. As a rule the safety engineer, superintendent and foreman pounded safety and all that goes with it into the workmen, creating in their minds the feeling that the safety department was separate from the operating department. In other words, safety and accident prevention were not made an actual part of the daily work. Thus our tactics have been wrong. The safety and welfare department is not a separate function but rather is an integral part of the operating department, and until it is so considered accidents cannot be eliminated. Accident prevention is a distinct part of every job, but not a separate part.

"What kind of a safety talk shall a foreman give his men? Actually should a foreman give his men a safety talk, or any talk at all? Yes, the foreman must talk to his men in order to instruct and educate them properly. We could spend many hours discussing the means and methods of giving a talk to the men. We would no doubt decide that we should plead with some employes, beg others, try to reason with a few and probably use a sledge hammer on the rest; but in the last analysis the kind of talk, whether on safety or other subjects, a foreman gives his men depends entirely upon the kind of talk the superintendent gives the foreman.

"In the safety meeting we should discuss the accident record, how accidents have occurred, means of preventing a repetition, reports of investigating committees, reports of inspection committees and other routine business, but the keynote and most interesting part of the meeting should be the talks by the safety engineer or safety committee chairman, and the superintendent. The superintendent should never fail to give some message to his safety committee. This message should 'sell' safety to the foreman, promote loyalty to the company, loyalty to his fellow workers, and loyalty to the men for himself and his family. These three types of loyalty form the basis for all efficient and well functioning organizations. If



The North American Cement Corp. Catskill plant first-aid team, which won first place in the contest. Left to right, top row, H. J. Kruse, D. F. Griscom, A. Wagner; front row, W. J. Farrell, W. L. Roscoe and F. P. McCloskey

The North American Howes Cave plant first-aid team won second place in the contest Left to right, top row, Don Shutt, A. G. Partain, L. Livingston, P. Van Dyke; front row, H. S. Vaughn and M. J. Wieland

a man is loyal to his organization he will not be guilty of any practices which would endanger company equipment or which would make it necessary, through accident, for him to deprive his company of his services for a length of time. If he is loyal to his fellow-workers he will not be guilty of any practices which would endanger their lives and limbs, and if he is loyal to himself and to his family he will make the most out of his job, which means he will provide the best he can for his family and not deprive them of their bread-winner through unnecessary accidents.

"The success or failure of any plant in its accident prevention work depends upon the kind of knowledge the superintendent imparts to his foreman. A certain organization comes to my mind in which the employes are continually selling that organization to their friends. They are proud of it and should you ask any one of those employes what kind of cement is made in the United States, they know of only one kind and that is the one they are helping to manufacture every day.

"Of what importance and of what use is the monthly safety meeting unless the discussion and information obtained in these meetings is carried from the committee room to all departments of the organization? We might just as well say what good or of what use are the papers presented here this morning unless the ideas can be carried back to your own organization and put into practical use. For this reason we believe it is essential for the foreman to hold a departmental safety meeting following the plant safety meeting. At the departmental meeting the foreman should review the discussion of the plant safety meeting, imparting to them briefly the same message given him by the safety committee chairman, the safety engineer and the superintendent.

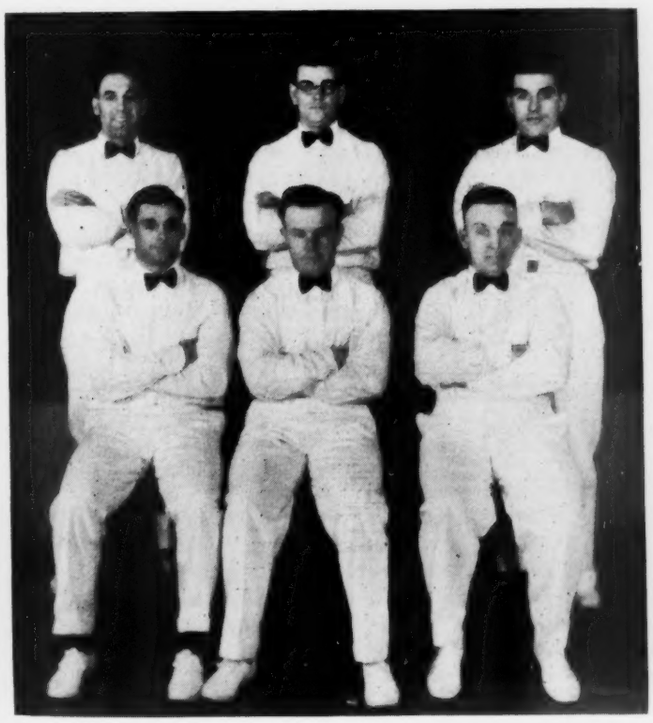
"He should also, as he in turn has been instructed, endeavor to instill in the minds of his men loyalty to the company, loyalty to his fellow men and loyalty to himself and family. The foreman cannot accomplish a clear accident record for his department if he merely pounds on abstract safety. He must endeavor to impress on their minds the fact that there is only one correct way to do every job and that way is the safe way. If the foreman can impart his message to the men in the same way as he has received it, he might say he has hit the button on the head.

"When the foreman sends his men up on to a scaffold he should instruct them in every detail of their work and should point out to them that their tools should be in first class condition, not alone from a safety standpoint but a dull chisel with a mushroom head will not only be a hazard to the workmen but will not give its utmost efficiency in use. The wrench with loose jaws is not only a hazard but the nut will not always be tightened to its proper degree with such a poor wrench. He should tell them not to place their tools at the edge of the footboards on the scaffold, not alone because they will fall down and possibly strike some other employes but also because if they fall down the workman must climb down the scaffold and retrieve his tool and climb up again.

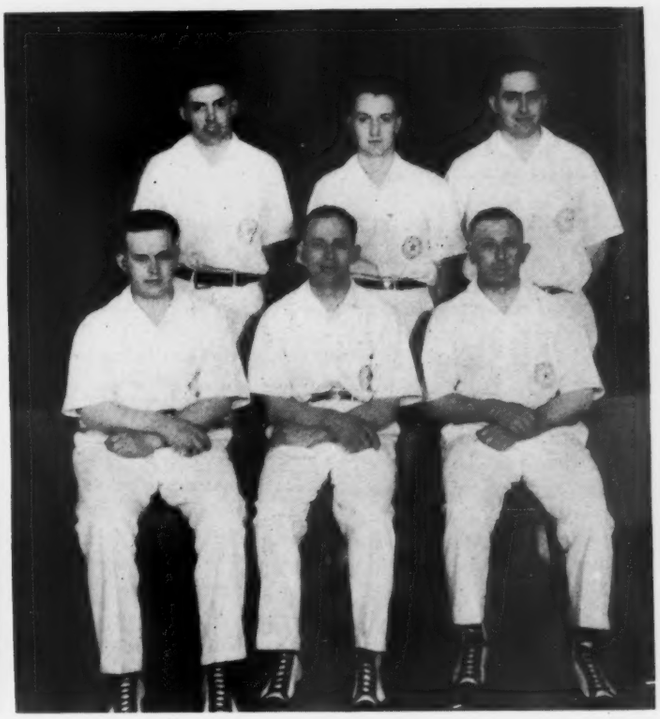
"When a workman is chipping brick for the relining of a kiln he should wear his goggles, not alone to save his eyes but he can do much more accurate work when he does not have to dodge the chips as they fly and need not fear getting a piece of these chips in his eye.

"The electric cable for the quarry shovels should be elevated to cross tees, not alone because of the hazard from shock created by holes torn in the cable covering by the shovel dragging the cable over the quarry floor, but also a cable so torn lying on the quarry floor will permit water to get through the insulation and possibly cause a 'short' and destroy the cable and possibly electric shovel equipment.

"Do we ask that the hookman at the bottom of the quarry incline signal the hoistman only because of the hazard to the workman? No, there is also the important factor that a quarry car loaded with stone and hauled up to the incline before the hookman is ready may also draw with it more than one loaded car, thereby creating too great a load for the motor on the hoist engine, with the result that the motor will be burned out. Thus, if we are to consider the injury to company equipment and efficiency of operation we see that if these two factors are impressed on the workmen, and the necessity of carrying on the work as instructed is made plain to them the safety part will take care of itself."



The first-aid team of the Glens Falls Portland Cement Co. took third place in the contest. Left to right, top row, T. C. Lemery, C. H. Boyden, W. F. Prevost; front row, L. Luciano, J. J. Donovan and P. Henry O'Leary



The Lone Star Cement Co. Hudson plant team was fourth. Left to right, top row, George Washburn, Lawrence Hanson, Vincent Wallace; front row, Jacob Burch, Ross Schermerhorn and Walter Wagner

Weather Hazards and Their Control

John H. G. Dempster, Canada Cement Co., Ltd., Port Colborne, Ontario, Canada, said: "The title of my talk may, at first sight, appear to be rather ambiguous—'Weather Hazards and Their Control.' With all the good work that has been accomplished by the Cement Section, and with all their experience in dealing with and overcoming obstacles in the line of accident-prevention, we hardly think we have got to the point yet where we can 'control' weather hazards. That which we *are* trying to do, however, is to control the *results* of weather hazards; to reduce the number of personal injuries in which the weather plays an important part.

"I suppose the greater number of you will infer that I am going to talk about 'winter weather' exclusively. While it is true that we who meet today have had a great experience in *real* winter weather, with the mercury consistently trying to get out of the bottom of the thermometer, yet summer weather has affected us; rain and heat have had their share in being contributing factors in our accident list and a hazard is created by any change for which we are not prepared.

"'A stitch in time saves nine.' Although our cement plants may differ in appearance, they are practically all alike from an accident hazard standpoint. Accidents similar in nature to those that are caused at other plants can be caused at our plant, unless steps are taken to prevent them. 'Safety first' as a slogan in our work is insufficient; it must be 'safety always,' which implies, not a start in safety work with a brass band, waving flags and banners and posters, only to allow the interest and enthusiasm to die down after a month's run, but a steady, plodding, determined effort that will keep on throughout every day of the year, summer and winter, so I am going to touch briefly upon mishaps in which the weather played one part, during different months of the year. I want you to bear with me for this story is leading to a statement, or rather a pronunciation, and I want you to get the full import of the whole thing at the end.

"January has always appeared to be a bad month in the cement industry, for a number of reasons. I say 'appeared to be,' for we cannot lose sight of the fact that plants which have operated without a personal injury for three consecutive years have operated through three Januarys as well as three Junes. However, during January, considerable repair work is in progress, men are temporarily shifted from one department to another, and in many instances do work with which they are not familiar. The poor old 'Powder Monkey' is working in the quarry in January, and his shovels and dinkeys are slipping and sliding along in the ice and snow; if the men are not on the absolute *qui vive* they are liable to be caught unawares. The quarry is a pretty bad place for a fall, but even cussing the weather won't do any good. The quarry is not the only place, however, where an accident can be caused in January. A man was standing on a pile of stone at the storage, which was frozen and undermined. It caved in and killed him. I know of another man who climbed on to the top of a hopper car of frozen coal, which was also undermined. He kicked the top, which suddenly let go, and down he went with it into the hopper.

John H. G. Dempster, Canada Cement Co., Ltd., who talked on weather hazards and their control

He wasn't killed, but that was his good fortune.

"In February, more especially in the northern and eastern part of this continent, we have severe winter weather, and in Canada perhaps a little more so, but because of a little irregularity in the manner of dishing it out, sometimes a thaw will bother our plants with ice. Our quarry faces and floors are icy and snow-covered and the walking is treacherous. For that reason we are compelled to take greater precautions when secondary shots are fired, so that men will have not only more time to seek shelter, but that they will have a safe path over which to hurry. A driller was shoveling snow and dirt on the top of the quarry face, to place his drill, when he slipped on a piece of ice and fell over the face into the quarry, severely injuring himself, but we also have the case of a shovel operator who, while attempting to tighten some bolts, slipped on some ice on the boom. He fell against the starting lever for the crowding engine. The engine started, he was caught in the gears and very nearly killed.

"Am I attempting to 'pass the buck?' Not by a big sight; I haven't finished yet.

"We get a sample of nearly every kind of weather in March, and that factor is what causes so much trouble. Snow, thaw and ice, following one upon the other, create a series of conditions that call for constant vigilance. Men have been killed by the ice and snow sliding from sloping roofs. We know that many buildings of our plants have an accumulation of dust on the roofs that tends to remove the sliding hazard, but our cement records contain an account of a case in which a 3-in. slab of ice slipped, owing to the thawing of the under surface; fell on a man and two children who happened to be below and all three were killed. Surely we have heard of 'snow guards.' March gives us many icicles, too, and one of the most foolish hazards that are often allowed to remain is these large dagger-shaped menaces hanging from the eaves. They hang with their points down, ready for a fatal thrust and we have a case where a woman was killed in March, in Niagara Falls, by an icicle dropping and piercing her skull. These hazards can be removed at the cost of a very few minutes' work.

"April is only a nice month in the mind of the spring poet. We get lots of rain, for one thing, and rain can cause exciting moments around electrical apparatus or machinery operated by electricity. There is the prevalence of 'grounded' wires, motors, iron and steel work and poles, and switches and controllers are not always protected. A quarry foreman was operating a shovel in a heavy rainstorm when he came into contact with a wet controller while throwing a lever. He received a shock of 440 volts and, because his hands and clothing were wet, he got the full force. He sustained severe burns in addition to the shock and died on the way to the hospital.

"When the wind is unleashed, it forms a real hazard, doesn't it? I remember a wind storm in May, when large pieces of caked dust from the roofs were flying through the air, and a part of the corrugated iron sheathing of a building sailed along quite a number of feet before it hit the ground. We even have on record the case of a man who was caught when the wind slammed a heavy door shut on his fingers, breaking two of them and amputating a third.

"In June we have a number of factors that, for many years, increased our accident toll. Our shipping and production conditions are generally at their peak and, coupled to these, is the condition of excessive heat. This toll was so bad a few years ago that it necessitated that the Portland Cement Association inaugurate a special endeavor to reduce accidents in June, and those behind the movement found that, like all other hazards against which a determined drive is directed, a very great reduction in accidents could not only be made in that month, but that the months following showed a reduced list of injuries also. Excessive hot weather causes a lot of trouble. When a man is uncomfortably cold, he is stimulated to work hard, exercise, and restore the glow of warmth, but when he is exhausted by continual and excessive hot weather and accompanying humidity, he is liable to become a hazard to himself and those around him. In heat exhaustion, differing from sun-stroke,

the victim is chilled, his temperature is low and he may be in a state of collapse which is the more serious condition. A paradoxical truth is that the excessive heat will cause its victim to become cold, if not checked, to the point of collapse, and as a consequence, even life may ebb slowly away. We know of a case where a stenographer in an office was overcome by the heat. She was moved to a rest-room and, instead of

M. J. Ankeny of the U. S. Bureau of Mines, who conducted the first-aid contest

being covered with blankets, ice was applied and the girl died before the doctor arrived. Taking the figures for the year, however, we find that we have far less personal injuries in the months of summer, in which weather conditions play a part, than we have in the months of the fall, winter and spring.

"The late summer months and the autumn can surely give us an opportunity to get rid of some conditions that aid the bad weather to create hazards. If we make sure that the approaches to our working points are clear and easy of access, and that loose rock or material lying around is cleared up, when these places are covered with snow and ice, no unseen trap will render the precautions of no account that you have taken to cope with the known dangers of slipping, sliding and falling. Ice in cracks is a tremendous force which sometimes rips overhanging rocks from the quarry face and sends them hurtling below, and frost will tend to put a clay bank into position to slide when it is thawed by the sun. If these conditions can be foreseen and proper precautions taken, men will not be injured by such hazards.

"In actual operation, inside the buildings of the plant, we can hardly say that the weather creates any untoward effect or increased hazard, but at least all entrances can be kept clear and outside stairways clean so that snow or rain will not interfere with the passage of the worker from one point to another. No matter how careful a man may be, he cannot prevent ice and slush from forming on outside walks, but every man can adapt himself to these conditions. It is our own duty to exercise care on slippery surfaces. A thorough housecleaning in the yard and outside of buildings is as necessary in the fall as in the spring, if not more so, because cleaning is not likely to be done after the snow falls and partially hidden objects may cause bad falls later on. If there is a stairway or elevated walkway that needs a railing, this should be done before weather conditions have helped a man to fall and break a leg.

"Accident records kept by the National Safety Council, the Portland Cement Association, and the Industrial Accident Prevention Association of Ontario, are replete with cases of injury in which bad weather was an agent. These records show that the largest number of accidents, in relation to the number of barrels of cement produced, are caused in January and February; these were about 14% of the year's total for 1929. It is true that a small reduction has been shown for the last three years, but the figures are even yet far too high. Why?

"Because our employes are not yet fully sold. Self-preservation is one of the first laws of nature, but that inherent trait is sometimes almost obliterated by thoughtlessness, and that is why safety work requires that a man must keep at it. It is only a policy of education that can win out; because education is the only medium by which our people can be brought to realize the common-sense and fundamental principles of safety, no matter where they are or what they are doing. Of the many accidents in our records, I have mentioned but a few. Could not every one of these have been prevented? It is impossible for anyone to take the lists of accidents kept by the three organizations I have mentioned, which come in the category of this talk, and point out just one that could not have been prevented. Then why are they caused? Weather conditions—pure bunk! Condition of the human element? Yes! Another factor enters here. With severe changes in weather, men are sometimes not fully protected by adequate clothing. Sometimes they neglect health precautions and, despite the statements of 'Ol' Doc' Brady, men can be brought into a condition whereby they are more susceptible to colds and illness. A sick man is a hazard.

"We cannot, as yet anyhow, control the weather, nor conditions arising from the weather, but we can most certainly control the frequency of human injuries resulting from these conditions. It is a wonderful fact that the National Safety Council has rated, for 1929, the Portland Cement Industry as the industry with the lowest accident frequency, out of a list of seventeen major industries. The highest frequency was 67.8 accidents per million man-hours; the average for all industries was 31.2, but the frequency for cement is but 7.5 lost-time accidents per million man-hours. Of course, we are proud of that record because we have all had a hand in it, but it makes every accident appear the more serious by comparison. I think the Portland Cement Association did a wonderful thing when it inaugurated the annual trophy to be won by the plant with a perfect record for a calendar year, but it did something far more wonderful when it inaugurated the system of awarding individual certificates to each man working safely throughout the year. We are a whole lot too liable to point with pride to the record of the organization as a whole, and forget that it is made up of individual records. If one man fails, a perfect record is unattainable, therefore our efforts should be to prevent *one* man from failing, not a lumped organization.

"Safety work in the cement industry is not an experiment nor is it a sideline; it is a part of our manufacturing process. Then why be inconsistent? Why should our executives shop all over the country to purchase equipment from the most reliable manufacturer, and then allow that equipment to be handled by a human being who is un-

James A. Pisarri, New York State Bureau of Rehabilitation, outlined work of restoring disabled workmen

reliable because he has not received a safety education? Why should we insist upon the highest grade of chemical knowledge for the compounding of our 'raw-mix' and be satisfied with unknown quantities when trying to reduce compensation expenditures and —why try to imagine that we are heeding the voice of the church and the law in the commandment 'Thou shalt not kill,' when because of the lack of instruction, or a few humanitarian measures enforced by the executive and his foremen, lives are sacrificed and bodies crippled in our industry every month?

"The executive and the foremen? Yes!

Big business and efficiency has demanded that they be held responsible but in no wise does it detract from the responsibility of *every individual,* whate'er his rank or no rank at all. I cannot for the life of me see 'weather conditions' offer a perfect alibi for human injuries. I can never be convinced that, because a man slips, falls and breaks a leg that the weather can be blamed.

"I am not treating this subject from a theoretical or visionary outlook. For the last nine years I have watched the manufacture of portland cement from quarrying to shipping, from the safety viewpoint, amidst weather conditions that ranged through all the extremes. Because of the marvelous records attained in accident-reduction, continued through the years, I can say that 'weather or no weather,' accidents can be prevented, if YOU want to prevent them, but if YOU fall down and your organization receives a jolt, be a sport and don't try to blame the weather."

Rehabilitation

James A. Pisarri, district director of the New York State Bureau of Rehabilitation, described the excellent work being done to restore disabled workmen to usefulness in part as follows:

"A bureau for the rehabilitation of the physically handicapped was established in the Division of Vocational and Extension Education, July 1, 1921, with offices in the Education building, Albany, and in the cities of New York, Syracuse, Rochester and Buffalo.

"The object of this bureau is to restore to remunerative occupations those who have received vocational handicaps by accident, disease or congenital defects. They must be citizens of the state, over 14 years of age, of sound mind and not blind, as the latter are served by the State Commission for the Blind.

"When the labor turnover in industry is considered, it is apparent that the physically handicapped, when intelligently advised, guided and trained, and placed in employment, become as stable and successful workers as do those who have never met with such misfortunes."

First-Aid Contest

The first-aid contest, as the closing feature of the afternoon program, was of unusual interest. Assisting M. J. Ankeny, of the U. S. Bureau of Mines, were the following who acted as judges: W. P. Binks, eastern sales manager, Bullard and Davis, New York City; M. R. Brodt, J. D. Brown and H. G. Porter, first-aid instructors of the New York Telephone Co., and Jules G. Steffin of the Mine Safety Appliance Co., Pittsburgh.

The contest schedule included four problems selected by the U. S. Bureau of Mines. During the dinner the results were announced as follows:

Winner: Team of the North American Cement Corp., Catskill plant, score 97.25. Awarded silver trophy cup presented by George Bayle, Jr., vice-president of the Glens Falls Portland Cement Co.

Second: Team of the North American Cement Corp., Howes Cave plant, score, 95.25.

Morris Fortuin, Pennsylvania-Dixie Cement Corp., presided as toastmaster

Third: Team of the Glens Falls Portland Cement Co., score, 94.25.

Fourth: Team of the Lone Star Cement Co., New York, score, 92.37.

The trophy becomes the permanent property of the winner.

Dinner

The annual safety dinner of this group followed adjournment of the meeting. Morris Fortuin, northern general manager of the Pennsylvania-Dixie Cement Corp., presided as toastmaster and Harry N. Holmes, field secretary of the World Alliance for International Friendship of New York City, was the principal speaker.

Registration

Alpha Portland Cement Co., Jamesville, N. Y.
Mike Clench, repairman.
M. Gorman, chemist.
A. F. Kanmerer, storekeeper.
Louis Nemeth, foreman.
Thomas F. Quinlan, chief electrician.

Alpha Portland Cement Co., Cementon, N. Y.
Jerome Benger, repairman.
Martin Grbavac, blasting foreman.
Frank Short.
Clarence Shorn, mill foreman.
J. Lyman Youncy.
Daniel Ziegler, plant engineer.

Canada Cement Co., Ltd., Montreal, Que.
A. G. Beck, superintendent.
Edward Gariepel, foreman.
W. H. Grady, safety director.
F. M. Whelan, superintendent's clerk.

Canada Cement Co., Ltd., Port Colborne, Ont.
Jack Dempster, storekeeper.

Canada Cement Co., Ltd., Hull, Que.
Ira M. Wood, first-aid attendant.

Glens Falls Portland Cement Co., Glens Falls, N.Y.
C. H. Boyden, repairman.
James J. Donovan, Jr., locomotive engineer.
Joseph Gagliardi, yard foreman.
Phillip Kuntz, foreman.
Theo. C. Lement, foreman electrician.
Louis Luciano, well driller.
F. P. Monaghan, works manager.
Con. Nealon, foreman.
P. H. O'Leary, welder.
Edward H. Parry, safety director.
Wilfred Prevost, construction foreman.

Lawrence Portland Cement Co., Thomaston, Me.
J. M. Pomeroy, electrical engineer.
O. E. Wishman, safety engineer.

Lone Star Cement Co. New York, Hudson, N. Y.
C. S. Andres, superintendent.
Dewey Benner, carpenter.
Jacob Burch, machinist.
Peter Claikowski, raw mills.
Cyrus Dukler, repairman.
Howard Frunk, repairman.
V. C. Hamilton, assistant to manager.
Lawrence Hanson, machinist.
G. A. Hummel.
Fred Preston, driller.
Henry Reutenauer, mill man.
Ross Schermerhorn, machinist.
C. I. Selfe, electrician.
Walter Wagner, machine shop.
Vincent Wallace, machinist.
George Washburn, welder.

North American Cement Corp., Albany, N. Y.
W. J. Fullerton, engineer.
F. W. Kelley, president.
C. R. Parks, treasurer.
Alexander M. Tyree, general purchasing agent.
R. E. Van Noy.

North American Cement Corp., Hagerstown, Md.
A. R. Couchman, safety director.

North American Cement Corp., Howes Cave, N. Y.
Lorenzo Livingston, analyst.
A. G. Partain, electrician.
S. H. Rhodes, chief electrician.
Donald Shutt, bag foreman.
Paul Van Dyke, power station operator.
Hubert V. Vaughn, combustion engineer.
Maurice J. Wieland, power department.
Raymond Young, storekeeper.

North American Cement Corp., Catskill, N. Y.
William Farrell, clerk.
Daniel Griscom, machine shop.
Ralph V. Grobe, electrician.
C. A. Hartman, quarry foreman.
Harold Kruze, auto mechanic.
F. P. McCloskey, blacksmith.
William L. Roscoe, mill foreman.
William J. Shufelt, foreman power department.
J. B. Van Deusen, machine shop foreman.
Albert Wagner, laboratory.
G. A. Witte, assistant general manager.

Pennsylvania-Dixie Cement Corp., Portland Point, N. Y., Nazareth, Penn.
Edward Bowman, shift foreman.
Vernon A. Closser, mill foreman.
Paul Crim, shovel operator.
David Fortuin, chief clerk.
Morris Fortuin, general manager.
R. B. Fortuin, assistant to manager.
William L. Hall, machinist.
James R. McConnell, power-house operator.
George Stickle, operator.
Donald H. Stier, storekeeper.
George Stretch, bag-house foreman.
F. P. Werner, superintendent.

Universal Atlas Cement Co., Hudson, N. Y.
H. A. Andrew, chief electrician.
George M. Becker, chief engineer.
L. Bray, maintenance.
Fred Cunningham, foreman, coal mill.
R. A. Dittmar, superintendent.
Roy R. Dreher, laboratory.
John Earley, clerk.
Albert Elting, electrician.
Daniel S. Kelly, foreman.
James McKeever, foreman machine shop.
Guy Shelden, steam shovel.
Lewis Sickles, foreman boiler house.
James J. Sullivan, employment manager.
John West, foreman.

Miscellaneous
M. J. Ankeny, senior foreman miner, U. S. Bureau of Mines.
William P. Binks, eastern district sales manager, Bullard Davis, Inc., New York City.
William Boratt, first-aid instructor, New York Telephone Co.
J. D. Brown, first-aid instructor, New York Telephone Co.
A. J. R. Curtis, assistant to general manager, Portland Cement Association.
John N. McDowell, safety inspector, State Department of Labor, Albany, N. Y.
James A. Pisarri, district director, Rehabilitation Bureau.
H. G. Porter, first-aid instructor, New York Telephone Co.
James G. Steffen, Mine Safety Appliance Co., Pittsburgh, Penn.
William Tuthile, first-aid instructor, New York Telephone Co.

Hazards in the Operation of Coal Mills and Kiln Departments

By John Davis

Turbine Room Operator, Manitowoc Portland Cement Co., Manitowoc, Wis.

WE CAN REACH a better understanding of the hazards in the use of powdered coal if we first consider the fineness to which it is pulverized. Suppose we take a piece of coal measuring 1 cu. in. It will have 6 sq. in. of surface exposure. Now suppose that we cut this inch cube into 8 ½-in. cubes, we shall double the surface exposure and if we cut each ½-in. cube into ¼-in. cubes we shall have double the surface exposure again, making it four times what it was in the first place. If we pulverize the cubic inch so that 95% of it will pass through a 100-mesh screen, a condition suitable for powdered fuel furnace, it is estimated that there will be about 200,000,000 particles and that the surface exposure will be 700 times that of the original cube.

If we suspend this powdered cubic inch of coal in the air, each of the 200,000,000 particles, more or less, will be surrounded by air and combustion will be very rapid. The coal will then burn like a gas and if confined it will explode like a gas.

Care should be taken to keep coal as clean as possible. Dust collects on walls, beams and such places. Should there be a small explosion in some part of the plant, the jar would start this coal dust to fall and being held in suspension the whole plant would be swept by flames.

Care should be taken in the use of extension lamps, especially when lowering them into coal hoppers, as a short-circuit or a broken lamp globe would cause an arc which, given the right conditions, would cause an explosion.

There should not be any electrical disconnects or switches that would be likely to arc when opened, placed inside of the coal plant. They should be placed outside of the mill room away from the dust. Direct-current motors would not be a very good installation for a pulverized fuel plant as there is always more or less sparking at the commutator brushes. Smoking should not be allowed in or around a pulverized coal plant.

It is very poor practice to use compressed air for cleaning up around the plant, or any other method that stirs up the dust.

Powdered coal should not be stored in a hopper for a period longer than 24 hours, as it will ignite from spontaneous combustion and it is a hazardous job to remove it.

Repair men should not be allowed to enter an empty coal bin until it has been properly ventilated and means provided to remove the man quickly in case he is overcome by gas.

Hoppers should be watched carefully to prevent flushing over, especially when starting a fire in a kiln, as there is always more or less backfire until kiln has been warmed up. Should a hopper flush over at this time, there is always a good chance for an explosion. Only experienced men should be allowed to start a fire and operate a kiln burning powdered coal as the improper mixture of fuel and air causes kiln to blow-back or back-fire.

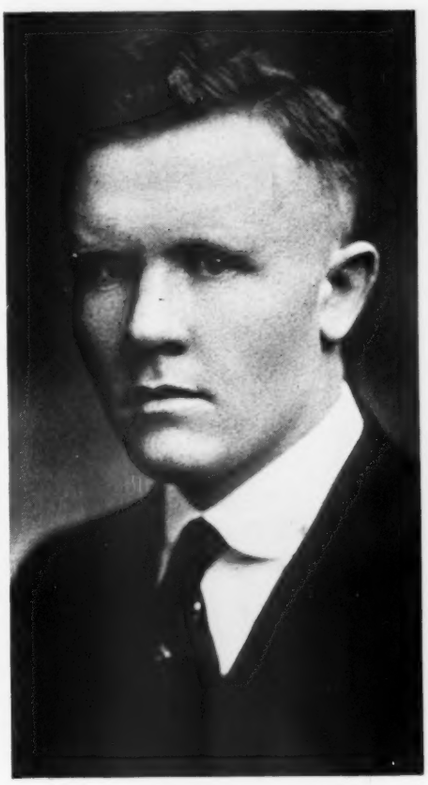
Coal feeds should be isolated from kiln before allowing repairmen to work in kiln or cooler, as there might be a leak in coal feed which might not be noticed and the hot kiln lining would ignite the coal and cause an explosion.

When taking old brick lining out of kiln or cooler look out for loose brickwork overhead that might be jarred loose and fall on a man's head or possibly bury him. When placing in new brick lining be sure that stay jacks are properly placed and safe before turning kiln over to place another section.

When men are working in a cooler and the kiln is in operation, be sure to have opening between kiln and cooler properly closed off to prevent kiln from blowing back into cooler in case of accidental stopping of draft on kiln. Powdered coal has been known to be carried over into boiler and lodged in baffling when first pass of boiler was partly blocked with dirt. When a man opened door of boiler for the purpose of blowing dirt from baffling with a hand lance the coal dust was stirred up and exploded, blowing out through door opening, burning man's face and hands.

Editor's Note

THE ACCOMPANYING PAPER by John Davis, one of the turbine room operators at the plant of the Manitowoc Portland Cement Co., was awarded first prize in a recent safety paper competition among mill employes of the Manitowoc plant conducted by F. E. Town, superintendent. The judges, whose decision was unanimous, were H. Vanderwerp, vice-president of the Manitowoc company, A. J. R. Curtis, of the Portland Cement Association, and W. M. Powell, safety director of the Medusa Portland Cement Co.



John Davis

Cement Rates to Be Studied

A MEETING of railroad representatives, cement manufacturers and other interested persons has been called by the Nebraska railway commission for April 28, at which time a general investigation will be made into the intrastate rates on shipments of cement with the hope of securing a reduction and a uniform scale of rates.

At the present time Nebraska is divided into three districts with separate scales applying to each. The commission points out in its resolution that the cement rates in Iowa and Illinois are from ½ to 1 cent lower than rates in Nebraska, although operating conditions are practically identical.

The division of the state into districts, it is pointed out, also operates to the disadvantage of shippers since sharp increases result where a shipment passes from one district to another, regardless of the length of the haul.

If the plan proposed is worked out rates on shipments between Nebraska points will be based on actual mileage rather than on zones. The plan is considered as particularly important in view of the large paving program which the state will undertake in the future.—*Lincoln* (Neb.) *Star.*

National Gypsum Co. Acquires Fibre Board Organization

THE National Gypsum Co., Buffalo, N. Y., announces its association with the MacAndrews and Forbes Co., Camden, N. J., manufacturers of "Maftex" insulation board, made of licorice-root fibre. The "Maftex" board is thus added to the "Gold Bond" line of gypsum and lime products now made and marketed on a national scale by the National Gypsum Co.

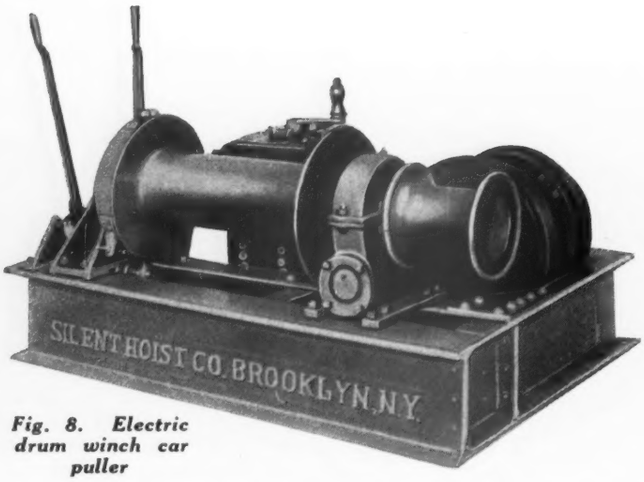


Fig. 8. Electric drum winch car puller

ELECTRIC WINCH CAR PULLERS

By Samuel Wunsch*

ALTHOUGH there have been installations in service for many years, only recently have electric winch car pullers come to be more fully and properly appreciated for their many inherent features and advantages. Electric winch car pullers are the simplest and safest means of providing a large drawbar pull, as is required for moving cars, especially where the very great pull is required for drawing cars up a grade. It should be noted that the pull required to move a given load of cars is *doubled* when the grade is but 1%, as compared to the pull needed for the identical weight on a level track; and so the drawbar pull required to move cars increases very rapidly as the grade of the track increases.

Electric winch car pullers are of two general types: Capstan car pullers (Figs. 1 to 7) for use with manila rope or marlin-covered wire rope; and drum winch car pullers (Figs. 8 and 9) for use with wire rope or cable which is attached to and stored on the drum.

Operation of Electric Winch Car Pullers

For the capstan winch car pullers (Figs. 5 and 6), one end of the rope is attached or hooked to the car, then taking three, four or five turns of the rope around the revolving capstan head, the cars move as the rope is drawn in.

In a similar fashion for the drum winch car pullers (Fig. 9), the rope is hooked to the car and then as the motor is started up the cable winds up on the drum and the cars move. On the drum winch car pullers a sliding steel jaw clutch is provided on the drum shaft, and when the clutch is disengaged the drum is free to turn on its own shaft, being fitted with bushings. The rope can then be unwound from the free-turning drum without need of running the motor. For all pulling and releasing operations, however, the clutch is left engaged, pulling and releasing of the cars being done electrically by running the motor forward or reverse by means of a reversing drum switch or controller. The drum is also provided with a manually-operated band brake, for quick stopping and holding of the load.

Figuring Drawbar Pull Required to Move Cars

The majority of the requirements for a car puller are very well met by the vertical capstan types (Figs. 1, 2, 3A, and 3B), used with manila rope, which permits pulling from almost any direction. In some few cases a horizontal capstan type (Fig. 4), also for use with manila rope, is more suitable. When the pull required is large, many cars are to be moved, or the cars are to be drawn

*Silent Hoist Winch and Crane Co., Brooklyn, N. Y.

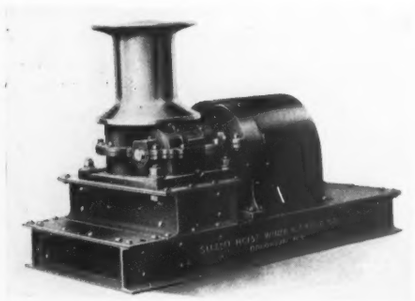


Fig. 1

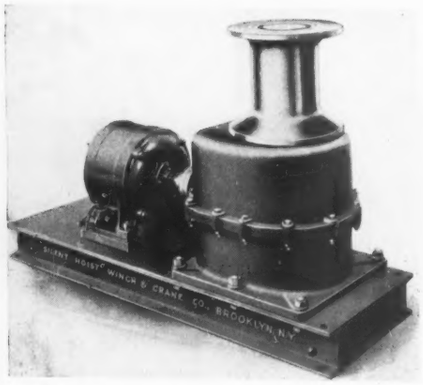


Fig. 2

Fig. 4
Some typical electric capstan winch car pullers in both vertical and horizontical types for use with manila or marlin-covered wire rope

Fig. 3A

Fig. 3B

up a steep grade, or where for any other reason it is desired to use wire rope or cable, then a drum winch puller (Figs. 8 and 9) is recommended. After the decision is made as to the *type* of winch car puller to be used, then the proper *size* of machine is chosen.

The proper size of machine is based primarily on the drawbar pull required to move the cars and contents, which will depend, of course, on the gross weight of the load and the prevailing conditions of the track. Expressed as a formula:

The pull required to move cars
$= T\ (15 + 20G + f \times C)$ pounds.
with $T =$ the *load* to be pulled in tons (weight of cars and contents),
$G =$ the *grade* of the track in per cent. (feet rise in 100 ft.),
$C =$ the *curvature* of the track in degrees
$= 5730$ divided by the radius of the curve in feet,
and $f = 0.8$ for 1 deg., 0.6 for 2 deg. to 4 deg., and 0.5 for 5 deg. and over.

Reading the formula again, it means just that the pull *in pounds* required to move cars is 15 lb. per ton (gross weight), plus 20 lb. per ton for each per cent. of grade and about ¾ lb. per ton degree of curvature, if any, of the track.

How to Use the Formula

The figures given above may be used as correct for the majority of cases, where the ordinary and usual conditions of cars and tracks prevail. They are not too conservative, so as give inordinately large and too safe answers. The one figure that is subject to change is the 15 lb. per ton, which has been found correct for ordinary standard-gage cars and the usual conditions of axle bearings, track, etc. This figure might be reduced to 10 lb. per ton for very heavy cars, where the axle bearings, tracks and other conditions are favorable, and as prevailing once the cars are under way and moving. The value should be increased to 20 lb. or 30 lb. per ton for light and narrow-gage cars or when the car axle bearings, track, inclement weather and other conditions are unfavorable and tend to increase the friction to be overcome and therefore the pull required.

Incidentally it is to be noted that consideration has not been given to such items as acceleration and wind resistance, which go into the determination of the pull required to move cars as in ordinary railroad practice, for these items are of no significance where cars are pulled at the relatively very low speeds (10 to 100 ft. per min.) and short distances (a few feet to perhaps a few hundred feet) where electric winches are employed to move cars in a plant or on a railroad siding.

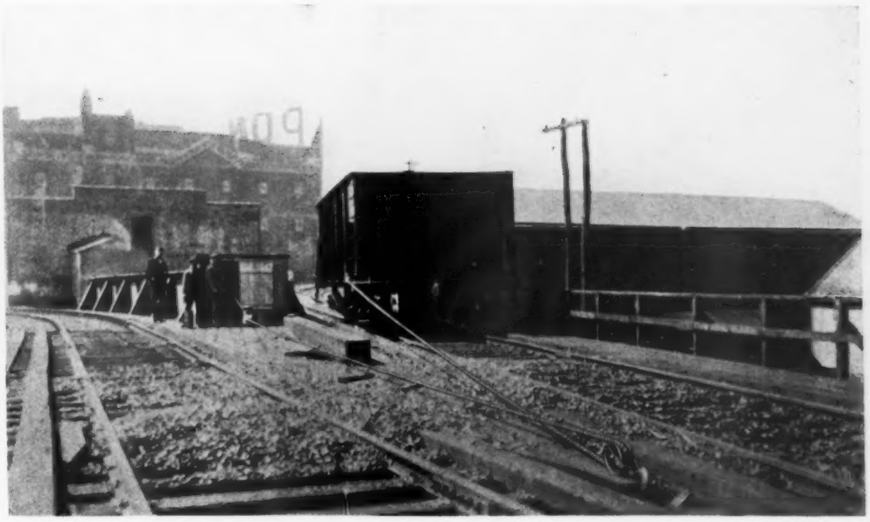


Fig. 6. This particular yard operation requires pulling through a snatch block

Winches are fundamentally machines providing a conversion of the *relatively* small torque at high speed of motors to a high torque at low speed, by means of a speed reduction, and then making this high torque available for use by tension (the rope) for pulling. A most efficacious means of providing the large speed reduction, the steady flow or torque desired, in a simple and compact manner, requiring a minimum of parts, is by a worm gear drive. A further important advantage in the use of the worm gear drive is that, for the pulling capacity available by the winch, the worm gear drive is self-locking and will therefore hold the load in any position automatically, and without need of ratchet and pawl or brake, if the current should fail or the motor stop for any reason—a decidedly worthwhile feature making for safety at all times.

Types of Motors Most Suitable

It is pertinent to discuss types of motors most suitable for electric winch car pullers, as the ordinary motors used for general industrial purposes do not serve the purpose best. It will be noted that the conditions call for getting the cars into motion from rest, which requires overcoming at the start an initial static friction, and this requires that the winch motor have a high starting torque.

Where alternating current is available, a "high-torque," squirrel-cage, induction motor is recommended. This high-torque, squirrel-cage motor is also termed an "elevator-type" motor being used also for elevator service. It is a squirrel-cage motor having a high resistance rotor and provides a high starting torque, about two-and-one-half times the normal running torque, and should be started directly across-the-line in order to retain the full starting torque characteristic which is so desirable for car-pulling service. Where speed regulation is desired and for the larger sizes of machines (where it is objectionable to start the motor across-the-line due to the large inrush of current and resulting disturbance in the electric transmission lines), the high-torque characteristics are obtainable by using the more costly and more complicated slip-ring, wound-rotor, induction motor with resistance starter or controller.

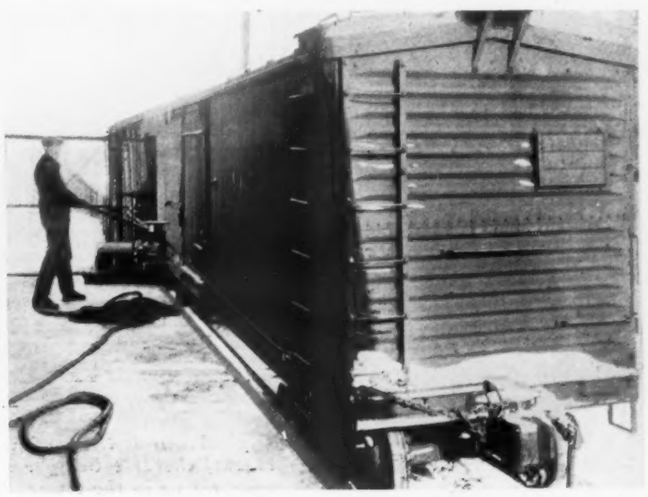


Fig. 5. Electric vertical capstan winch at work

induction motor with resistance starter or controller.

For direct current the high-torque characteristics are obtained by using a series wound motor if the winch puller is always under control of the operator, and the motor is not allowed to run idle. Otherwise (as with capstan car pullers), a compound wound motor is recommended in order to avoid overspeeding if the winch should be run idle for any length of time.

With the drawbar pull required to move the cars known, calculated as previously noted, knowing also the speed at which

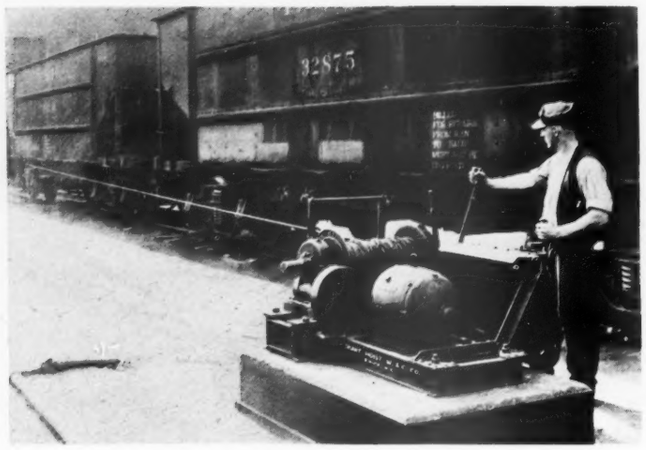


Fig. 9. Drum winch car puller

the cars are to be moved, and allowing for the efficiency of the winch gearing, the horsepower of the motor required is readily determined. Assuming an efficiency of the winch gearing at 75%, which is just about right, or, close to this figure, using 25,000 ft.-lb. per min. as available for pulling each horsepower of the motor, the motor horsepower = drawbar pull (in lb.) × speed (ft. per min.) / 25,000

As with but very few exceptions the winch car puller is used only for a few minutes to a half hour at most, and is shut off altogether, or runs idle at intervals; even when there is a continued movement of cars, the motor can be rated for its power for half-hour or one-hour duty.

Electric Capstan Car Pullers

The electric vertical capstan car pullers are usually made in three standard styles. (Style Y, Fig. 1, is the least costly assembly of a weather-proof machine, the gearing being enclosed and the motor covered by a sheet steel housing, or a totally enclosed motor can be used; Style V, Fig. 2, is the direct-connected machine, altogether weather-proof and water-tight, the gearing being all enclosed in one housing and the motor also being totally enclosed; Style X, Figs. 3A and 3B, is the totally enclosed and water-tight, the all-outdoor machine. Fig. 4 is the horizontal capstan and puller, which has also the enclosed gearing and with a totally enclosed motor is also a weather-proof machine.)

The principal feature of these electric capstan car pullers is that they do not have any clutch or brake or any other control levers, operation being merely in the manipulation of the rope. A few turns of the rope are taken around the revolving capstan head, and pulling and hoisting are easily done; by holding on to the rope to the load is held in position, or by leading the rope to the head the load is released, always under control of the operator. The vertical capstans have the advantage that pulling can be done from any direction, without the use of sheaves or snatch-locks. The capstan heads are machined smooth all over to minimize wear of the rope, and the vertical heads are fitted with a bronze cover plate.

Electric Drum Winch Car Pullers

The electric-drum winch car puller is shown by Fig. 8. Car-pulling with the drum winches is done by using cable which is stored on the drum. The drum is provided with a steel jaw clutch, which when disengaged permits unwinding of the cable without running the motor, and there is also a "Raybestos"-lined manually operated brake for quick stopping or holding of the load. Operation of the drum winch car puller is by means of a forward and reverse drum type switch or controller.

In some few cases, to meet unusual requirements, certain special features can easily be provided. These might include: Grooved drum, automatic electric brake, push-button or other remote control from one or more points, automatic limit switches, etc.

Installations of Electric Winch Car Pullers

Figs. 5 and 6 show two typical installations of electric vertical capstan car pullers. Fig. 6 shows the method of pulling through a snatch-block, when required, as is obvious. Figs. 7A and 7B show outdoor installations of electric capstans as barge movers; Fig. 7A shows a method of pulling with an endless line, with control from a remote point (by the bucket operator up in the tower) with ability to shift the barge in either direction; Fig. 7B shows the more usual method of using an electric vertical capstan as a car puller or barge mover. Fig. 9 shows an installation of an electric drum winch pulling a string of cars. Installations of drum winch car pullers are in service being used continually for pulling 8 cars, 12 cars, 16 cars, and in some instances as high as 20 standard-gage cars at a time, all performing highly satisfactorily.

Industrial Accident Statistics

THE National Safety Council, Chicago, has published in complete form, conveniently indexed by industries, a report on industrial accidents occurring in 1928. This compilation is based on returns submitted by industrial establishments and other agencies such as trade associations.

In the rock products industry, the cement section report based on 130 plants, shows a total of 82,620,677 man-hours worked with an accident frequency of 7.47 and severity rate of 3.96. The reduction has been consistent since 1919. Marked progress in safety is indicated in the quarry section, both in the frequency and severity records—due largely to interset in safety competitions.

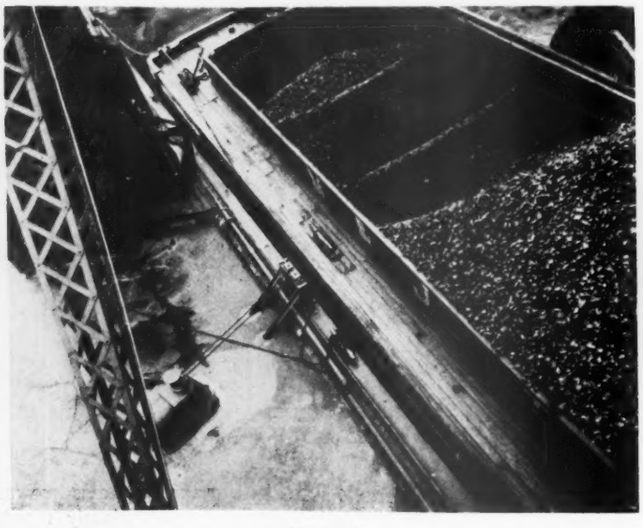


Fig. 7A

Fig. 7B

Typical installations of winches pulling through snatch blocks, the left being remote controlled by the bucket operator up in the tower, thus shifting the barge in either direction

Dredge Embodies Unique Portability Developments in Design and Construction

Columbus Gravel Co., Columbus, Miss., Seeking Maximum Equipment Efficiency, Has Created a New Departure to Dredge Boat Design

By Bradley S. Carr*

THAT the dredge engineering of today is expressing the growth of the economic management of sand and gravel plant operations where hydraulic equipment is used is typified by this producer, wherein "fitness of purpose" construction is employed.

The Columbus Gravel Co., Columbus, Miss., recently launched and placed in use a new 10-in. pump size, electric-powered dredge which is an unusual departure from commonly accepted construction. The builders have evolved a design that affords portability of all elements of the dredge where a new deposit location set-up is required. In the past, where the depletion of an aggregate acreage required moving the dredge equipment, and it was not practicable to dig a canal to float the dredge boat through from the old to the new location, or to transport the hull proper without excessive expense, the usual procedure was to remove all equipment from the boat hull and place it on a new boat. This meant, at times, the abandonment of a boat hull that was good for many years of use; and the practice was not economical.

Fig. 1 shows in perspective view the 10-in. pump dredge from the forward end. The boat is of pontoon construction with a flat deck, retangular in shape, of 26 ft. width and 50 ft. length. The buoyancy elements

*Manager of the pump department and hydraulic engineer for the American Manganese Steel Co., Chicago Heights, Ill.

The 12-in. pump dredge and manner of handling discharge pipe lines

Two views of the 10-in. pump dredge. At left, Fig. 1, general perspective view; right, Fig. 4, an interesting airplane view

are six plate steel, welded type tanks of cylindrical shape with flat ends; of a size each, 6 ft. diameter and 26 ft. long. Each tank is provided with two manholes, one near each end. The tanks are placed thwartship, their length being the same as the deck width. The tanks are cradled to a platform frame of heavy timbered, well-braced construction, which supports the deck and its equipment loads. Wide-faced timber saddle blocks are used between the tanks and the frame which aid in maintaining the tanks in place and distributing the frame loads over wide areas of the tank surfaces. The tanks are clamped to the frame by U-shaped, steel straps, fitted with threaded rod ends and turnbuckles.

The decking planks are placed thwartship. It will be noted that the boat frame is made with saddle blocks providing for a seventh or middle tank, should the boat have to carry at some future time heavier equipment loads or require new machinery arrangement for other location work. For the 10-in. pump size of equipment, with the dredge pump and its motor aft, and the hoist and suction pipe and its frame rigging forward, six tanks placed as shown, with three tanks carrying each deck and load, gives good weight distribution and trim-ship to the dredge as a whole, both at rest position and during digging operations. The deck length of 50 ft. was established as a satisfactory standard dimension for this company's dredge boat work and gives satisfactory spacing of equipment for both 10-in. and 12-in. dredge pump equipment, which sizes are adaptable to the company's production program, should the 12-in. size of equipment be used for future work.

Some of the Unique Features

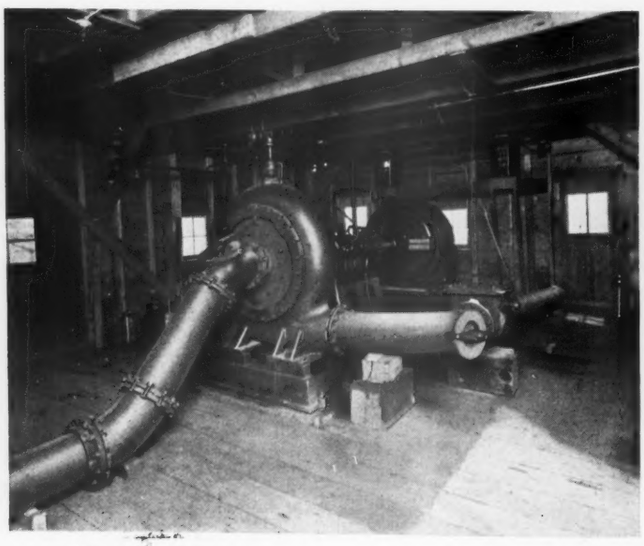
All equipment, together with the A-frame, is provided with timber base rails which are fastened to the deck and its platform frame. The cabin is of well framed construction with wood sides and roof.

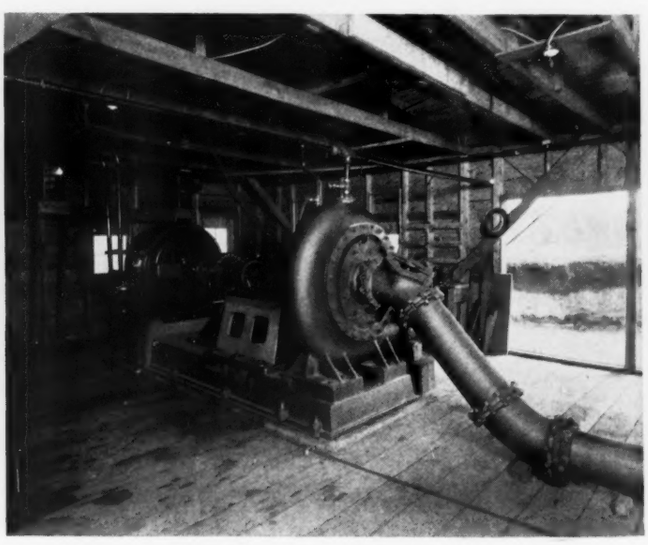
Unique with this design, the builders have provided each end of the boat with wood aprons, hinged to the platform frame. These aprons tend to dampen the intensity of wave actions, which are caused by bank cave-ins, and give good steadying effect to the boat because of the shape of the tank pontoons.

The deposit materials are readily excavated by a plain type suction pipe line and nozzle mouthpiece. Not having to provide for a ladder agitating device has simplified the dredge construction as a whole. The suction pipe line is supported by a boom with full front horizontal swing, accommodated with a ball-and-socket heel pivot connection at the base of the A-frame. To prevent undue and excessive reversal or bending of the suction hose connection at the deck position, this portion of the suction pipe line is bridled by a line attached to the top of the A-frame and regulated as desired in placement by a hand chain block. A single drum hoist, electric motor powered, handles the suction pipe line. A small boom swinger with individual electric motor governs the placement of the swing of the boom. Hand winches are used for the dredge head lines.

The operator has full, close-up, clear vision of the deposit bank being worked. All equipment controls are centralized, affording maximum responsiveness with minimum expenditure of effort.

A 10-in. Amsco Type H heavy duty dredge





Figs. 2 and 3. Some interior views showing motor, discharge line with manganese fittings, flap valve and manner of mounting

Fig. 5. The pump dredge unit and shore plant of the Columbus Gravel Co., Columbus, Miss.

pump is used for the production of materials. It is direct connected to a 250-hp. General Electric motor, slip-ring design, 590 r.p.m. full load speed fitted with drum controller, 50% resistor of continuous duty type, for electrical characteristics of 3-phase, 60-cycle, 2200 volts.

Figs. 2 and 3 are interior cabin views and illustrate the dredge pump and its motor installation, together with the hull suction and discharge pipe lines hook-up. All pipe line fittings, like elbows, nipples and the flap valve, parts subjected to abrasive wear and tear, are made of manganese steel of standard Amsco design.

A high pressure, centrifugal water pump, electric motor driven, services the gland seal region and the main bearing of the dredge pump and takes care of priming work of the dredge pump in conjunction with a water type ejector.

The electrical installation has been made in a thoroughly approved manner with all wiring encased in conduits, ceiling supported, and led down to the motors. This consideration complies with maximum safety.

Fig. 4 shows an interesting aeroplane view of the dredge.

Plenty of Deck Walk Space

The dredge design affords comfortable deck walk space throughout, both inside and outside the cabin. It is roomy, well lighted and ventilated, with properly distributed equipment loads. Unique with the cabin framing, the construction affords additional truss stiffness to the frame supporting the steel pontoons, making the boat thoroughly sturdy for all working loads met with.

This producer has successfully demonstrated that maximum results and economies are obtained with building for the purpose of suiting equipment construction to local deposit operation conditions. They have solved the problem of being able to transport the dredge from one set-up location to another, all with ease of dismantling and reassembling the component parts. The time and expense required are insignificant compared to their former practices.

This type of dredge is thoroughly satisfactory to its work wherein the water areas, or small lakes, worked in are the result of its own creation by excavation. No river currents or excessive windage actions are met with in its work. If the latter field conditions should have to be entertained by a boat of this type of construction, careful consideration would have to be given to added elements of design, to make the boat comply with the new load conditions imposed. For any currents met with, it is well to use force and aft steel tie structural members mounted underneath the pontooons, fitted with saddles, all tie rodded to the platform frame, giving added longitudinal stiffness to the boat hull proper.

The composite design as a whole, together with all details, reflects a thoroughness of technique of construction, an atmosphere of clean-cut crispness. It is the result of much careful thought effort and drafting room design detail on the part of C. F. Harris, general manager of this company.

From the date of its commission into use, the dredge with continuous operation, has proved to be a most practical and economical excavation machine for this company's work.

Washington State Asbestos Deposit Being Opened

THE Asbestos-Talc Products of Washington, Inc., Burlington, Wash., is developing an asbestos deposit which is claimed to have great possibilities. A tunnel with laterals is being driven into the hillside deposit.

Equipment, consisting of a rock crusher, hammer mill and air flotation plant, is being installed to enable the company to place a high grade crude fiber on the market.

Geologists who have investigated the asbestos structure said the vein runs half a mile and is between 200 to 400 ft. wide, at least. Such a vein is large enough to operate a good sized industry for twenty-five or fifty years.

C. R. Buck is secretary and general manager of the company.

Vermont Slate Men to Put Slate "On the Air" via WGY

THE SUM of approximately $3000 was assured by prominent slate manufacturers in the West Pawlet, Fair Haven and Poultney, Vt., slate belt to sponsor broadcasts through radio station WGY, Schenectady, N. Y., in the interest of the slate industry during the coming months at an enthusiastic meeting and banquet of manufacturers and operators held recently in Poultney.

Richard Griffiths of Fair Haven, chairman, presided at the banquet and among the speakers were E. R. Norton of Granville, N. Y., Arthur Morrow of West Pawlet, Edward Edwards and Walter Smith of Fair Haven.

The Forty-Niners drum corps and talent throughout the slate belt are to co-operate in the broadcasts. The four first entertainments it is understood are to be given by the Forty-Niners.—*Rutland* (Vt.) *Herald.*

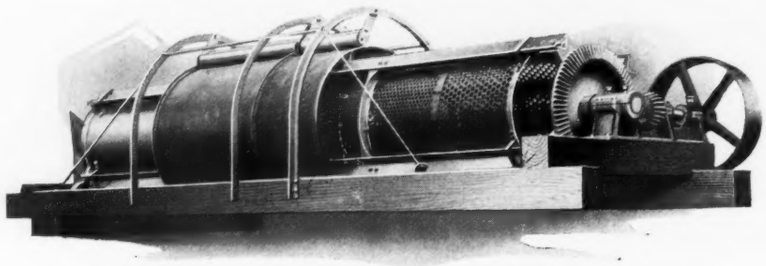
Front view of the 12-in. pump dredge equipment

New Machinery and Equipment

New Screen Features Sand Jacket

A NEW screen, equipped with high carbon manganese content steel plates to insure a maximum period of service, has been announced by W. Toepfer and Sons Co., Milwaukee, Wis.

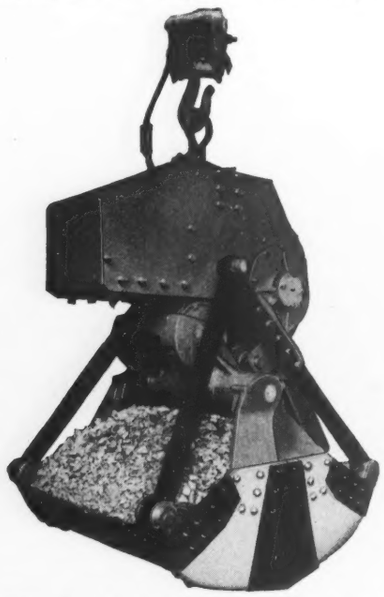
The screen features a sand jacket with smooth outside surface, upon which hinged rollers rotate. The action of the rollers in forcing back any particles that may become lodged in the perforations, it is claimed, assures a maximum screening capacity at all times. Comprising the feed end, are nickel-iron trunnion ring and large diameter cast-steel trunnion rollers mounted on either babbitted or roller bearings. The main gear and drive head, which are cast in one piece, are supported by a one-piece main bearing. The screen is made in diameters and lengths to suit any requirements, and with either all steel or timber frames. Cast steel stiffener ribs are furnished with all screens 16 ft. and over in length.



Screen with sand jacket upon which hinged rollers rotate

New Electric Bucket

A NEW electric motor operated power-arm type clamshell bucket, ¾-cu. yd. capacity and up, is announced by the Erie Steel Construction Co., Erie, Penn. The "Strayer"



Clamshell bucket operated by electric motor

bucket, as it is called, operates on either a.c. or d.c. and can be used for both inside and outside work, handling sand and gravel, crushed stone, slag, clinker and other materials. It is built entirely of steel with reinforced digging scoops to stand hard service.

Some of the features claimed for the bucket are: Easy installation; simplified digging and emptying control by which amounts to be handled are at the discretion of the operator; automatic mechanism control which eliminates spillage, danger to operator, etc., standardization of parts. The bucket is claimed to be smooth in action and to require no readjustment, frictions, clutches, chains or springs. Trip ropes are not needed, the manufacturers state, and when put on cranes with lifting magnets no additional wires are required, it is said.

A new bulletin describing and illustrating this bucket is now available from the manufacturers.

New Rod for Carbon Arc Welding

WELDITE C-No. 6 Fluxed, a new rod designed for carbon arc welding, is announced by the Fusion Welding Corp., Chicago, Ill. This rod is claimed particularly adaptable for the welding of mild steel plates and castings. Welding speed has been substantially increased and the deposit is strong and ductile, being more readily machinable than deposits made with the usual filler rod used with the carbon arc process, the manufacturers state.

New Explosive Developed

A NEW type of explosive, now being marketed under the name of Gelamite, is announced by the Hercules Powder Co., Wilmington, Del.

It is claimed that this is the first successful production of an explosive which will do work ordinarily requiring gelatine dynamite at a considerable reduction in blasting costs. The manufacturers assert that it combines the safety and economy features of the high ammonia content dynamites with the more water-resistant characteristics of gelatin, at the same time being semi-plastic and easy to handle. It is adaptable to either open or underground shooting. The new gelamites are being produced in three strengths, successfully replacing the old style gelatins and extra gelatins of 30% to 60% strengths.

Gelamite was first placed on the market in small quantities late last year. Field tests were so successful, state Hercules officials, that a large demand for the new explosive arose.

Boiler Water Control Device

EASY MAINTENANCE of boiler water concentration is claimed to be possible through the use of the Elgin "Concentrometer," the concentration or blow-down meter recently placed upon the market by the Elgin Softener Corp. This instrument shows boiler concentration at a glance, directly in grains per U. S. gallon. The Concentrometer consists of a combination thermometer and hydrometer, the thermometer having a graduated scale from 80 to 100 deg. F. The hydrometer scale, which reads directly in grains per U. S. gallon, is calibrated for every 10 grains and has a range from 0 to 500.

To use the Concentrometer, a sample is obtained from the water column line after blowing out all stagnant water, about a quart

Instrument for maintenance of boiler water concentration

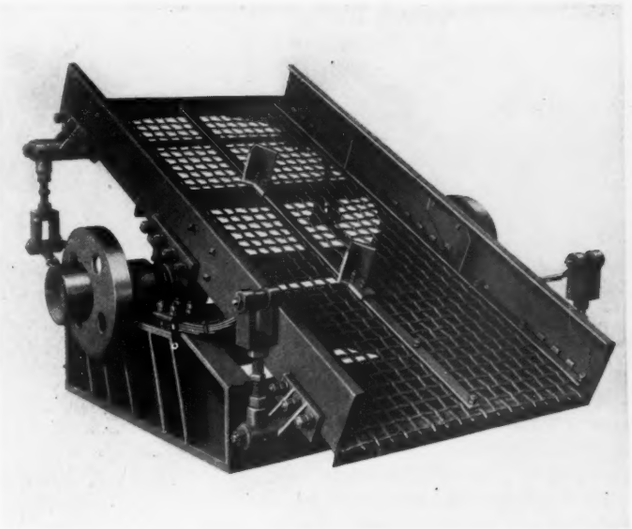
of water being blown into a metal container, where it is allowed to cool. This water is then poured into the sample jar and the Concentrometer is lowered into it and allowed to find its own level. When the water sample has cooled to 90 deg. F., as shown by the thermometer scale A, scale B should be read at the level of the water in the sample jar. Scale B shows the concentration in grains per U. S. gallon. As the equivalent concentration varies with temperature, the reading should be taken at 90 deg. F. It is then possible to compare all boiler waters and have them all upon the same basis of comparison.

Vibrating Screen with Spring and Shackle Mountings

A LINE of screens for grading crushed stone, gravel, slag and other coarse materials, has recently been placed on the market by Huron Industries, Inc., Alpena, Mich., under the trade name of Huron "Heaviduty" screens.

The principle of operation is based on a positive circular path movement or vibration transmitted mechanically to the screen frame so that all points on the screening surface are actuated in the same plane, the movement being perpendicular to the flow of material at the highest point of the "throw."

The screen is substantially constructed, the box-type base being made of semi-steel castings. Motion is imparted to the frame by a large-diameter eccentric drive shaft mounted on oversize heavy-duty Timken roller bearings which are enclosed by annular-groove and labyrinth seals to retain the lubricant and to exclude dirt and moisture. Two flywheels with adjustable counterweights are provided to balance the rotating mechanism and prevent transmission of vibration to the base. Special ship-channel side plates stiffen the screen frame, which is stabilized by four cantilever leaf springs equipped with adjustable shackles for changing the angle of inclination of the frame. A pulley for flat belt or one for multiple-strand V-belt can be used on either end of the drive shaft, and a bracket for mounting the motor can be attached to the base.



Single deck model of vibrating screen

The screen can be furnished in single-deck or double-deck models, with screen frames 3 by 6, 4 by 8 or 5 by 10 ft. in size, and will accommodate any type of screen cloth or plate.

New Remote Control Electric Railway System for Quarries

RAILWAY CARS operated by electric remote control will transfer cement rock from the quarry to the crusher on a haulage system soon to be built by the Trinity Portland Cement Co., Dallas, Tex. A novel system of remote control, devised by the General Electric Co., will govern the operations of the cars. General Electric engineers were called upon to solve the problem. The "riderless larry car" system, previously applied by that company to another installation, was adapted here.

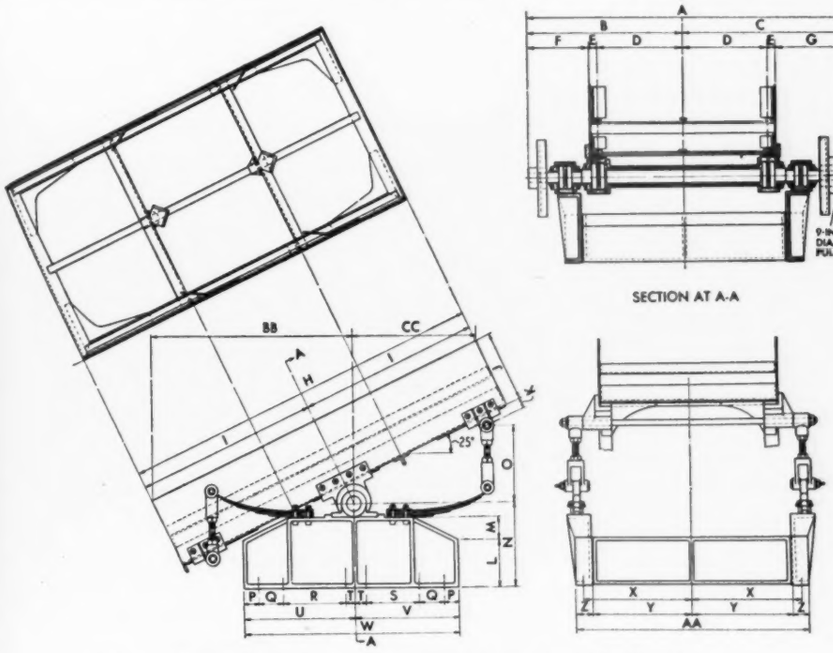
Two operators, located where they can view the loading and unloading of the cars and their movements, are enabled by this system to govern practically all the operations of the cars. The track on which the cars will run will be divided into a number of sections. Four motor-driven cars will ride over the track, each propelled by two 50-hp. squirrel-cage motors. Energy for driving the motors will be collected from the track and an extra rail system. Switches in front of the centrally located operator will control the delivery of energy to each section of track. Thus by energizing all the sections of the track the car will run from one end to the other.

The cars will be stopped by interrupting the electric current to the section on which the cars are traveling. Electric solenoid brakes, operating automatically when the current is turned on or off, will stop the car when the energy supply is interrupted. The direction of travel of the cars on any section can be changed as simply as the current can be turned on or off—merely by throwing a switch.

Another interesting feature of the installation will be the conservation of power made possible by the use of the squirrel-cage induction motors. An inherent characteristic of such motors is that they will tend to maintain constant speed under all circumstances. On down grades gravity will not speed the cars up, but will be automatically converted into electricity, for the motors will then act as generators. The electricity thus generated will be fed back into the power system, helping to operate other cars on other sections of track.

The use of induction motors is new for such applications. Direct-current motors are usually employed for such service.

The dump cars to which the electric drive will be applied are being built by the Atlas Car and Manufacturing Co.



Side and end elevations and cross-section view of vibrating screen

Regulations for Airport Construction Discussed at Joint Conference

REPRESENTATIVES of the underwriters and manufacturers of airplanes discussed the proposed regulations covering airport construction drafted by the National Board of Fire Underwriters at a conference held March 22 under the auspices of the Aeronautic Branch of the Department of Commerce.

The regulations as submitted define and specify the size of buildings and the materials to be used in construction. The structures are classified in accordance with degrees of safety from flames.

The fire hazard at an airport is recognized and the regulations seek to make the structures as near fire safe as possible under conditions which of necessity exist by the very nature of the work carried on at such places.

Hangars of fireproof construction may be two stories in height, all others are restricted to one story. No basements, cellars or pits are to be excavated or constructed below the floor level with the exception of a boiler or furnace room for a heating plant, which may be maintained if properly partitioned or separated from the rest of the building.

Hangars which are not equipped with sprinkler systems are limited to 10,000 sq ft. between exterior or fire walls. In the event of sprinkler installation, the area may be increased to 25,000 sq. ft. and to 30,000 sq. ft. if the height of the ceiling does not exceed 20 ft.

For construction purposes, one of these basic types may be used; fireproof or fully protected construction, semi-fireproof or partially protected construction and slow burning construction.

Fireproof construction is that in which all walls are of approved masonry or reinforced concrete and the structural members have fire resistance ratings sufficient to withstand the hazards involved.

Slow-burning construction is that in which the walls are of approved masonry or reinforced concrete and the interior structural elements, including posts, floor and roof construction, consists of heavy timbers with minimum corners or ignitable projections.

The floors shall be at or above grade and constructed of earth; concrete or other types of approved masonry or reinforced concrete construction. Treated wood blocks on a concrete base may be used except in the repair sections.

All openings in outside walls within 50 ft. of other structures shall be protected by standard fire doors, shutters or fire windows.

All lighting will be restricted to electricity and the installation of all wiring will be done in accordance with the provisions of the national electric code.

It is provided that heating shall be by steam, vapor, hot water, hot or warm air. Heating plants should preferably be located in separate buildings. If the heating plant is located in the same building, a separate room should be provided which is to be used for no other purpose and cut off horizontally and vertically from all other parts of the building by reinforced concrete walls at least 6 in. thick. Entrance to the room containing the heating plant should be from the outside only.

The repair shop should be a room separated from the storage space by masonry or reinforced concrete fire walls. The general overhauling of airplanes should be restricted to the repair section and only inspections and replacement of parts should be carried on in the storage section.

Lead and carbon burning, fusion, gas and electric welding, blow torch work, motor testing and all operations involving open flame operations shall be restricted to the repair shop.

The cleaning of motor parts and other airplane parts should preferably be done by the use of nonflammable liquids. If volatile flammable liquids are used for this purpose, cleaning operations should be carried on in the open air or in a separate room located in the repair shop section and separated therefrom by fire resistive partitions.

The "dope," as it is commonly termed, consists of cellulose nitrate or cellulose acetate dissolved almost always in a volatile flammable solvent.

Both the acetate and nitro-cellulose "dope" are hazardous when wet with the solvent, partaking the hazard of the solvent. The process of applying either form of "dope" and the presence of freshly doped surfaces form a great hazard which requires special measures for protection.

The draft further provides that all hangars or divisions of fire resistive or incombustible construction exceeding 10,000 sq. ft. in area shall be equipped throughout with a system of automatic sprinklers complying with the regulations governing the installation of automatic sprinkler equipment.

In cases where gypsum slab ceilings of approved construction are suspended from the lower chord of trusses in such a manner as to effectively cut off the space above, the inspection department having jurisdiction may permit the omission of sprinklers, provided the space cannot be used for storage purposes and is properly vented through the roof.

The draft further specifies that standpipe connections must be maintained with adequate pipe and hose connections, and that the connections shall be so located that not more than 75 ft. of hose will be needed to reach any part of the building. Water pressure shall be such as to throw streams over the highest buildings under protection.

Provisions must also be made for the maintenance of hand fire extinguishers and first-aid fire equipment.

The greatest protection, however, is in the primary consideration of proper fire safe and fire resistive construction of all buildings forming the airport center.

Arrow Sand and Gravel Co. Takes Out Group Insurance

H. J. KAUFMAN, president of the Arrow Sand and Gravel Co., Columbus, Ohio, recently placed a contract for group life insurance on all the employes of his company. Stephen Stepanian is vice-president and general manager.

The insurance was placed with the Missouri State Life Insurance Co.

First-Aid and Mine-Rescue Contest to Be Held at Louisville, Ky.

THE ninth International First-Aid and Mine-Rescue Contest, sponsored by the Joseph A. Holmes Safety Association and the United States Bureau of Mines, Department of Commerce, will be held at Louisville, Ky., September 16, 17 and 18, 1930. The dates and place for the holding of this annual outstanding mine-safety event have been approved by Scott Turner, Director of the Bureau of Mines, and president of the Joseph A. Holmes Safety Association, following an invitation given by the Governor of Kentucky, the Mayor of Louisville, and the Louisville Convention and Publicity League.

The International First-Aid and Mine-Rescue Contest is held under the auspices of the Joseph A. Holmes Safety Association and the Bureau of Mines, with the co-operation of the National Safety Council, the American Red Cross, and various mine operators' associations and miners' organizations. Expert first-aid and mine-rescue teams from many of the important mining districts of the country compete at these events for a number of prizes and trophies donated by different mining or safety organizations. Each first-aid team is required to perform certain definite problems in first-aid practice, calling for the treatment of injuries and proper handling of the patient. The mine-rescue teams, provided with oxygen breathing apparatus and other necessary equipment used by rescue crews in coal and metal mines, work out practical problems such as are likely to be encountered in underground rescue and fire-fighting operations.

Employes of coal and metal mines, quarries and metallurgical plants, and workers in the oil and gas industries are eligible to participate in the contest. More than 400,000 workers in the different mineral industries have been trained in first-aid or mine-rescue methods by the Bureau of Mines, over 82,000 having been so trained in the past fiscal year.

Cement Products

Caskets and Other Products Made of Artificial Stone by New Process

By F. H. Colman
Los Angeles, Calif.

AN INVENTOR, F. H. Paul, of the Dur Kraft Co. of Culver City, Calif., is now manufacturing "stone" caskets by a patented process for the making of synthetic stone. This process is similar to that used by nature in forming stalactites in limestone caves. Water is impregnated with silica and various minerals to the saturation point and when this solution is exposed to the air it solidifies into "stone." In nature this process takes a long period of time, but in the manufacturing process it takes only five hours.

Interior view of Dur Kraft factory showing caskets removed from molds ready for cold glaze. Bird baths, etc., in background

A light metal frame is made in the form of a casket. This frame is inserted in a mold where it is held in place while the solution of synthetic stone is sprayed into the mold until the metal frame is covered to a depth of 3/8 of an inch. The solution solidifies rapidly when exposed to the air and in five hours the casket can be removed from the mold and is ready for finishing. The casket when it comes from the mold has the appearance of poured concrete, although it is much lighter and stronger. The completed casket weighs less than 80 lb. and it will withstand a pressure of 170 lb. per sq. in.

Tests show it to be one of the strongest for its weight of any of the materials used in the structural arts. A jar made from the synthetic stone held water for one year without leaking or sweating. In addition it was found that slime did not form on the interior of the jar during the year.

Glazing Process

When the casket is removed from the mold it is given a coat of cold glaze. This glazing process is similar to the method used in applying "Duco" to an automobile in that the material to be used is put in liquid form and either sprayed or brushed on. The finish is determined by the material used in this cold glaze and includes materials ranging from copper to marble. Some of the caskets are made to simulate marble by a skilled workman with a brush, and these cannot be distinguished from genuine marble until they are lifted. Those made up in polished "mahogany" were especially handsome and could not be distinguished from the real wood. This cold glaze can be used for a variety of surfaces such as sidewalks and floors as well as for cementing glass surfaces.

Synthetic Stone Manufacture

This process for manufacturing synthetic stone has been used successfully in making several other products. Bronze pottery made with a synthetic stone base to give it lightness and strength has a cold glaze finish of bronze. Pottery has been manufactured in various colors and finishes and its strength, durability and lightness have made it popular in the market. Bird baths, tables, fountain pools and garden seats in white marble have also been popular.

A section of synthetic stone floor has been put in at the Dur Kraft factory with good results. The floor is 1 in. thick and is braced at 5-ft. intervals. This floor has stood up under regular factory use satisfactorily and it is expected that the product will be valuable in the building industry.

The scientific experiments have been carried on for ten years in perfecting the process. For the last two years commercial production and experimentation has been under way. The factory has been unable to fill orders for caskets and for this reason has temporarily devoted all of its equipment to the manufacture of caskets rather than to pottery and other lines. The owners expect to expand and go into a larger factory where they can increase production in the near future.

Iowa Production of Concrete Products in 1929

IOWA products manufacturers produced approximately 3,500,000 8x8x16-in. concrete block (equivalent), 60,000 cu. ft. of cast concrete stone, 1000 concrete burial vaults and numerous other cement products in 1929, which was the best construction year Iowa has enjoyed since 1922. That the concrete products industry reflected this condition is clearly shown by the fact that in 1929 the production was about equal to 1928 despite a decrease of 10% in the number of plants operating.

Unusual Cement Products

ONE picture herewith illustrates the method taken by two automobile clubs of two different cities in Kane county, Illinois, to keep drivers in the right path, according to where they want to go anywhere in the county.

Jointly they set up concrete mile posts at prominent road intersections throughout that territory. The posts not only indicate the direction of a town but the number of miles distant. The designers warn would-be vandals that a five-dollar fine will be meted out for damages to any of the posts. Two of the four sides of each post is lettered with the name of the Aurora Auto Club, and the other two bear in like letters the title of the Elgin Motor Club.

Each post is surmounted with wooden sign boards bearing names of towns and distances.

A useful concrete highway guide post

The contrivance shown in the second picture illustrates a novel use for concrete. The builder and user is a real estate man at Pine Haven near Park Ridge, Ill. He wanted to let people know that he had a *safe* proposition for them, so he set a two-ton iron safe on top of a concrete pyramid. The center of the foundation rests on solid rock but the sloping sides are made of concrete. Thousands of travelers who pass close to the object, and the subdivision on which it is built, are moved to inquire about it before they get out of sight.

Concrete pyramid used for novel advertising

Limes and Their Uses

HORTON LIME CO., San Francisco, Calif., is circularizing an interesting booklet on its products, "Blubber Bay" lime and "Apex" hydrated lime. Slaking lime for putty, plaster mortar, whitewash, the use of lime in spray material, in concrete, in water softening and purification, and for brick or plastering mortar is covered very comprehensively in this booklet; which also gives formulas for preparing the lime for various purposes. Limes for the chemical industry, for poultry use, for neutralizing sour soil, for sugar manufacture and for numerous other industries are also touched upon.

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N. J.	.48	.48	1.15	1.25	1.40	.....
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.25	1.15	1.75	.....	1.75	1.75
Buffalo, N. Y.	1.00	1.05	1.05	1.05	1.05	1.05
Burnside, Conn.	.75*	.75*	.....	.....	.....	.....
Erie, Penn.	.75	.95	1.40	1.40	.....	.....
Machias Junction, N. Y.	.65	.65	.65	.....	.65	.65
Milton, N. H.	.....	.....	1.75	.....	1.25	1.00
Montoursville, Penn.	1.00	.60	.50	.50	.50	.40
Northern New Jersey	.50	.50	1.00–1.25	1.00–1.25	1.00–1.25	.....
South Portland, Me.	.....	1.00	2.25	.....	.....	.....
Washington, D. C.	.55	.55	1.20	1.20	1.00	1.00
CENTRAL:						
Appleton, Minn.	.....	.50	1.25	.....	1.50	.....
Attica, Ind.	.....	.....	All sizes .75–.85			
Barton, Wis.	.....	.40	.50	.60	.60	.60
Algonquin, Ill.	.60	.30	.30	.40	.40	.40
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Des Moines, Iowa	.40– .60	.60– .80	1.50–1.70	1.50–1.70	1.50–1.70	1.50–1.70
Eau Claire, Wis.	.40	.40	.55	.85	.85	.....
Elkhart Lake and Glenbeulah, Wis.	.40	.40	.60	.60	.60	.60
Grand Rapids, Mich.	.....	.50	.....	.80	.80	.70
Hamilton, Ohio	.65– .75	65.– .75	.65– .75	.65– .75	.65– .75	.65– .75
Hersey, Mich.	.....	.50	.....	.70	.70	.70
Humboldt, Iowa	.40– .50	.40– .50	1.10–1.30	1.10–1.30	1.10–1.30	1.10–1.30
Indianapolis, Ind.	.50.– .60	.25– .60	.40– .60	.45– .75	.45– .75	.45– .75
Kalamazoo, Mich.	.....	.80	.....	1.10	1.10	1.10
Kansas City, Mo.	.70	.70	.....	.....	.....	.....
Mankato, Minn.	.55	.45	1.25	1.25	1.25	.....
Mason City, Iowa	.50	.50	.85	1.25	1.25	1.25
Milwaukee, Wis.	.91	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.35	.35	1.25	1.35	1.35	1.25
St. Paul, Minn. (e)	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Urbana, Ohio	.65	.55	.65	.65	.65	.65
Waukesha, Wis.	.....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.00	1.00
SOUTHERN:						
Brewster, Fla.	.40	.40	.....	.....	.....	.....
Charleston, W. Va.	.70	1.25	1.25	.....	.....	.....
Eustis, Fla.	.....	.40– .50	.....	.....	.....	.....
Fort Worth, Texas	.75	.75	1.00	1.00	1.00	1.00
Knoxville, Tenn.	.85	1.00	1.20	1.20	1.20	1.20
Roseland, La.	.30	.30	.70	.70	.60	.70
WESTERN:						
Los Angeles, Calif.	.10– .40	.10– .40	.20– .90	.50– .90	.50– .90	.50– .90
Oregon City, Ore.	3.00–3.50g	1.00–1.50	1.00–1.50	1.00–1.50	1.00–1.50	1.00–1.50
Phoenix, Ariz.	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.70	.60	1.15	1.20	1.15	1.15
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.00*

*Cu. yd. ‡Delivered on job by truck. (e) Prices f.o.b. N. P. Ry.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.25	.....	.....	4.00	.....
Cheshire, Mass.	Sand for soap, 7.00–8.00					6.00–8.00	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	2.50–3.00	.....
Elco, Ill.	Soft amorphous silica, 92%–99% thru 325 mesh, 18.00–40.00 per ton						
Kasota, Minn.	.....	.....	.....	.....	.....	.....	1.00
Montoursville, Penn.	.....	.....	.....	1.35–1.60	.....	.....	.....
New Lexington, Ohio	2.00	1.50	.....	.....	.....	.....	.....
Ohlton, Ohio	1.75*	1.75*	.....	2.00*	1.75*	1.75*	.....
Ottawa, Ill.	1.25–3.25	2.25–3.50	1.25–3.25	1.25–3.25	1.25	3.50	3.50
Red Wing, Minn. (a)	.....	.....	.....	.....	1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	.....

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	.....	1.50
Eau Claire, Wis.	4.30	.50–1.00
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25–3.25	1.25
Red Wing, Minn.	.....	1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.	.....	1.75

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. plant.

Cheshire, Mass., in carload lots	5.00–7.00
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00–5.00
Silica and Mendota, Va.	2.50–3.00

Bank Run Sand and Gravel

Prices given are per ton, f.o.b. producing plant or nearest shipping point.

Appleton, Minn.†	.55
Algonquin, Ill.¶ (½-in. and less)	.30
Brewster, Fla. (sand, ¼-in. and less)	.40– .50
Burnside, Conn. (sand, ¼-in. and less)	.75*
Chicago, Ill., and Grand Haven, Mich.†	.92–1.20
Des Moines, Ia. (sand and gravel mix)	.60–1.05
Fort Worth, Tex.¶ (2-in. and less)	.65
Gainesville, Tex.¶ (1-in. to 2-in.)	.55
Gary and Miller, Ind.†	1.15–1.40a
Grand Rapids, Mich.¶ (1-in. and less.)	.55
Hamilton, Ohio¶ (1½-in. and less)	.50–1.00
Hersey, Mich.¶ (1-in. and less)	.50
Kalamazoo, Mich.	1.85b
Mankato, Minn.†	.70
Oregon City, Ore.—All sizes at bunkers	1.00–1.50
Pueblo, Colo.—†River run sand	.50
Winona, Minn.†	.60
York, Penn. Sand, ¼-in. and less, 1.00; 1/10-in. down	1.10

*Cubic yard. †Fine sand, 1/10-in. down. (a) Cu. yd., delivered Chicago. (b) 1½ cu. yd. ¶Gravel.

Current Price Quotations

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.91¼	3.20	4.30¶
Atlanta, Ga.	.....	2.19†	3.49¶
Baltimore, Md.	.....	2.26	3.56¶
Berkeley, Calif.	.....	2.14	.....
Birmingham, Ala	.....	1.85†	3.15¶
Boston, Mass.	.44½	1.78–1.88	3.27¶
Buffalo, N. Y.	.48¾	1.95–2.05	3.35¶
Butte, Mont.	.90¼	3.61	.....
Cedar Rapids, Ia.	.....	2.03–2.16	2.99f
Centerville, Calif.	.....	2.14	.....
Charleston, S. C.	.....	a2.29†	3.26¶
Cheyenne, Wyo.	.71½	2.36	.....
Chicago, Ill.	.....	1.95*	3.25¶
Cincinnati, Ohio	.....	2.14*	3.44¶
Cleveland, Ohio	.....	2.04*	3.34¶
Columbus, Ohio	.....	2.17*	3.47¶
Dallas, Texas	.....	1.65	3.14¶
Davenport, Iowa	.....	1.94–2.04	.....
Dayton, Ohio	.....	2.14*	3.44¶
Denver, Colo.	.63¾	2.55	.....
Des Moines, Iowa	.48½	1.94	2.99f
Detroit, Mich.	.....	1.95*	3.25¶
Duluth, Minn.	.....	1.84	.....
Fresno, Calif.	.....	2.33	.....
Houston, Texas	.....	1.75	3.38¶
Indianapolis, Ind.	.54¾	1.99*	3.29¶
Jackson, Miss.	.....	2.29†	3.59¶
Jacksonville, Fla.	.....	†2.34b	3.26¶
Jersey City, N. J.	.....	2.13	3.43¶
Kansas City, Mo.	.48	1.92	3.22¶
Los Angeles, Calif.	.36½	1.46	.....
Louisville, Ky.	.55½	2.12*	3.42¶
Memphis, Tenn.	.....	2.29†	3.59¶
Merced, Calif.	.....	2.01	.....
Milwaukee, Wis.	.....	2.10*	3.40¶
Minneapolis, Minn.	.....	2.07	.....
Montreal, Que.	.....	1.60‡	.....
New Orleans, La.	.43	1.92†	3.22¶
New York, N. Y.	.48¼	1.93–2.03	3.33¶
Norfolk, Va.	.....	1.97†	3.27¶
Oklahoma City, Okla.	.59	2.36	3.66¶
Omaha, Neb.	.56½	2.26	3.56¶
Peoria, Ill.	.....	1.92	3.32¶
Pittsburgh, Penn.	.....	1.75	3.25¶
Philadelphia, Penn.	.....	2.15	3.45¶
Phoenix, Ariz.	.....	3.51	.....
Portland, Ore.	.....	2.30	.....
Reno, Nev.	.....	2.76	.....
Richmond, Va.	.....	2.32†	3.62¶
Sacramento, Calif.	.....	2.25	.....
Salt Lake City, Utah	.70¼	2.81	.....
San Antonio, Texas	.....	.....	3.42¶
San Francisco, Calif.	.....	2.04	.....
Santa Cruz, Calif.	.....	2.10	.....
Savannah, Ga.	.....	†2.29a	3.16¶
St. Louis, Mo.	.48¾	1.95*	3.25¶
St. Paul, Minn.	.....	2.07	.....
Seattle, Wash.	.....	1.90	.....
Tampa, Fla.	.....	2.00†	3.41¶
Toledo, Ohio	.....	2.20*	3.50¶
Topeka, Kan.	.52¾	2.11	3.41¶
Tulsa, Okla.	.55¾	2.23	3.53¶
Wheeling, W. Va.	.....	1.92–2.02	3.32¶
Winston-Salem, N.C.	.....	2.44†	3.54¶

Mill prices f.o.b. in carload lots, without bags, to contractors.

Albany, N. Y.	.....	2.15	.....
Bellingham, Wash.	.....	2.25	.....
Buffington, Ind.	.....	1.70	.....
Chattanooga, Tenn.	.....	2.05	.....
Concrete, Wash.	.....	2.65	.....
Davenport, Calif.	.....	2.05	.....
Hannibal, Mo.	.....	1.90	.....
Hudson, N. Y.	.....	1.75	.....
Leeds, Ala.	.....	1.65	.....
Lime & Oswego, Ore.	.....	2.40	.....
Mildred, Kan.	.....	2.35	.....
Nazareth, Penn.	.....	2.15	.....
Northampton, Penn.	.....	1.75	.....
Richard City, Tenn.	.....	2.05	.....
Steelton, Minn.	.....	1.85	.....
Toledo, Ohio	.....	2.20	.....
Universal, Penn.	.....	1.70	.....

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags, and all discounts deducted. Add 40c per bbl. for bags. *Includes dealer and cash discounts. †Includes 10c cash discount. (a) 44c refund for paid freight bill. (b) 38c bbl. refund for paid freight bill. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c disc. 15 days. ‡Includes sales tax.

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
....EASTERN:						
Buffalo, N. Y.	1.35	1.35	1.35	1.35	1.35	1.35
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.00
Jamesville, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00
Oriskany Falls, N. Y.	.50–1.00	1.00–1.35	1.00–1.35	1.00–1.35	1.00–1.35	1.00–3.00
Prospect Junction, N. Y.	.50– .80	1.15u	1.15	1.10	1.10	1.10
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Shaw's Junction, Penn. (e)	.85	1.20–1.35	1.20–1.35	1.20–1.35	1.40	1.30–1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill. (b)	2.00	.....	2.00	.....	.....	.....
Cypress, Ill.	1.15	1.10	1.00	1.15	1.15	1.20
Davenport, Iowa	1.00	1.50	1.50	1.30	1.30	1.30
Dubuque, Iowa	.....	1.10	1.10	1.10	1.10	.....
Dundas, Ont.	.50	.80	.80	.80	.80	.80
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	.....
Greencastle, Ind.	1.25	1.10	1.10	1.00	1.00	1.00
Lannon, Wis.	.80	1.00	1.00	.80	.80	.80
McCook, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.75–1.00	1.65–1.85	1.45	1.15	1.05	.95
Sheboygan, Wis.	1.00	1.00	1.00	1.00	.....	.....
Stone City, Iowa	.75	.....	1.10	1.00	1.00	1.00h
Toledo, Ohio	1.60	1.70	.....	1.60	.....	1.60
Toronto, Canada (i)	2.70	2.70	2.50	2.50	2.50	2.50
Waukesha, Wis.	.....	.90	.90	.90	.90	.....
Wisconsin points	.50	.....	1.00	.90	.90	.....
SOUTHERN:						
Cartersville, Ga.	1.00	1.50	1.50	1.35	1.00	.90
Chico and Bridgeport, Texas	.50	1.30	1.30	1.25	1.20	.....
Cutler, Fla.	.50– .75r	.....	....	1.75r	.....	1.10g
El Paso, Texas (v)	.50	1.25	1.25	1.00	1.00	1.00
Graystone, Ala.	Crusher run stone 1.00 per net ton					
Olive Hill, Ky.	.50–1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.25	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.10	1.25	1.25	1.25	1.00	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Rock Hill, St. Louis, Mo.	1.45	1.45	1.45	1.45	1.45	1.45
Stringtown, Okla.	.50	1.30	1.30	1.25	1.20	.....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90–1.00	2.25	1.75	1.75	1.25	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	.....	2.00	1.45	1.20	1.15	.....
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.00–1.40	2.10	1.25–1.90	1.00–1.50	1.00–1.50	.....
Richmond, Calif.	.70	.....	1.00	1.00	1.00	.....
Toronto, Canada (i)	4.70	5.80	.....	4.05	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	.....	.....	1.75	1.75	1.60	.....
Chicago, Ill.—Granite	2.00	1.70	....	1.50	1.50	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.50	1.75	1.50	1.25	1.25	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Toccoa, Ga.—Granite	.50	1.35	1.35	1.25	1.25	1.20

(a) Limestone, ¼ to ⅛ in., 1.35 per ton; Lime flour, 8.50 per ton. (b) Wagonloads. (c) 1 in., 1.40. (d) 2-in., 1.30. (e) Price net after 10c discount deducted. (g) Per cu. yd., 3-in. and less. (h) Rip rap. (i) Plus 25c per ton for winter delivery. (n) Ballast, R.R., .90; run of crusher, 1.00. (q) Crusher run, 1.40; ¼-in. granlithic finish, 3.00. (r) Cu. yd. (t) Rip rap, 1.20–1.40 per ton. (u) ⅛-in. and less. (v) Roofing stone, 1.50 per ton.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Allentown, Penn.	1.00–1.50	.40– .60	.80–1.00	.50– .80	.50– .80	.60– .80	.80
Bethlehem, Penn.	1.25–1.75	.50– .70	1.00–1.25	.60– .80	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.25–1.75	.60	.90	.60– .90	.60– .90	.60– .90	....
Reading, Penn.	2.00	1.00	.....	1.00	.....	.....	.....
Swedeland, Penn.	1.50–2.50	.60–1.10	1.00–1.25	.90–1.25	.90–1.25	1.25	1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	.....	1.30*	1.80*	1.45*	1.45*	1.45*	1.45*
Jackson, Ohio	.....	.65*	1.80*	1.30*	1.30*	1.30*	1.30*
Toledo, Ohio	1.50	1.10	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	.....	1.05*	1.80*	1.45*	1.45*	1.45*	1.45*
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1¼ in. to ¼ in., 1.05; ⅝ in. to 10 mesh, 1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$; 0% $MgCO_3$, 90% thru 100 mesh 4.50

Belfast, Me.—Analysis, $CaCO_3$, 90.4%; $MgCO_3$, trace; 90% thru 100 mesh, per ton 10.00

Branchton, Penn.—94.89% $CaCO_3$; 1.50% $MgCO_3$, 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh; per ton 5.00

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh 1.50

Cartersville, Ga. 2.00

Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton 6.00

Gibsonburg, Ohio—Bulk, 2.25; in bags.. 3.70

Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh 3.50

Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk 2.50

Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton 2.00

Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh 5.00

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1% $MgCO_3$; 90% thru 10 mesh 1.50

Cartersville, Ga.—50% thru 50 mesh 1.50

Chico and Bridgeport, Texas—Analysis, 95% $CaCO_3$; 1.3% $MgCO_3$; 90% thru 4 mesh 1.00

Colton, Calif.—Analysis, 95-97% $CaCO_3$; 1.31% $MgCO_3$, all thru 14 mesh down to powder 3.50

Cypress, Ill.—Analysis, 96% $CaCO_3$; 90% thru 100 mesh, 1.35; 50% thru 100 mesh, 1.25; 90% thru 50 mesh, 1.20; 50% thru 50 mesh, 90% thru 4 mesh and 50% thru 4 mesh, all 1.10

Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton 1.10

Dubuque, Ia.—Analysis, 64.04% $CaCO_3$; 29.54% $MgCO_3$; 50% thru 50 mesh 1.00

Fort Spring, W. Va.—Analysis. 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 50 mesh; bulk, per ton 1.15–1.25

Gibsonburg, Ohio—90% thru 10 mesh.... 1.00–1.50

Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh, sacked 5.00

Jamesville, N. Y.—Analysis, 89% $CaCO_3$; 4% $MgCO_3$; 90% thru 100 mesh; in paper bags, 5.10; bulk 3.85

Lannon, Wis. — Analysis, 54% $CaCO_3$ 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00
Screenings (¼ in. to dust) 1.00

Marblehead, Ohio—90% thru 100 mesh.... 3.00
90% thru 50 mesh 2.00
90% thru 4 mesh 1.00

McCook and Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh ..... .80

Olive Hill, Ky.—90% thru 4 mesh ..... .50

Rocky Point, Va.—50% thru 200 mesh, bulk, in carloads, 2.00; 100-lb. paper bags, 3.25; 200-lb. burlap bags 3.50

Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh 1.15–1.70

Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75

West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 100 mesh, bulk 100-lb. paper bags, 4.75; 100-lb., cloth 3.50 5.25

Waukesha, Wis.—90% thru 100 mesh, 3.65; 50% thru 100 mesh 2.10

*Less 25c cash 15 days.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton 6.00

Hillsville, Penn., sacks, 5.10; bulk 3.50

Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh (bags extra) 3.50

Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk 2.25–3.50

Waukesha ,Wis.—85% thru 200 mesh, bulk 4.00

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	11.40	.....	.....	17.50	.....	20.65
Buffalo, N. Y.	.....	.....	.....	12.00	.....	.....	.....	.....
Knickerbocker, Devault, Cedar Hollow and Rambo, Penn.*	.....	9.50	9.50	9.50	8.00	9.50	8.50	.....
Lime Ridge, Penn.	.....	.....	8.75	.....	6.50	8.00[3]	5.00	.....
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.75	7.50	.....
Carey, Ohio	9.50	6.50	6.50	.....	8.00	.....	8.00	.....
Cold Springs, Ohio	.....	7.75	7.75	.....	.....	.....	7.50	.....
Gibsonburg, Ohio	10.50	.....	7.75	.....	7.00	9.00[9]	7.50	.....
Huntington, Ind.	.....	6.50	6.50	.....	.....	.....	.....	.....
Little Rock, Ark.	.....	14.40	.....	14.40	.....	.....	11.90	.....
Luckey, Ohio*	10.50	7.75	7.75	.....	.....	.....	7.00	.....
Marblehead, Ohio	.....	6.50	6.50	.....	.....	.....	7.00	.....
Milltown, Ind.	.....	9.00	8.25	9.50	7.50	.....	7.00	.....
Scioto, Ohio	10.50	6.50	6.50	7.50	7.00	.....	6.00	15.00
Sheboygan, Wis.	.....	10.50	10.50	10.50	.....	.....	9.50	.....
Tiffin, Ohio	.....	.....	.....	.....	8.00	10.00	.....	.....
Wisconsin points	.....	11.50	.....	.....	.....	.....	9.50	.....
Woodville, Ohio	10.50	7.75	7.75	11.50[24]	7.00	9.00[9]	7.00	.....
SOUTHERN:								
Cartersville, Ga.	.....	9.00	.....	.....	.....	13.50	.....	15.00
Graystone, Ala.*	12.50	9.00	.....	12.50	.....	.....	7.50	.....
Keystone, Ala.	.....	9.00	.....	9.00	.....	.....	7.50	.....
Knoxville, Tenn.	18.00	9.00	9.00	7.50	6.00	1.25[10]	6.00	.....
Ocala, Fla.	.....	11.00	.....	.....	.....	.....	.....	.....
Pine Hill, Ky.	.....	9.00	8.00	9.00	.....	.....	6.00	12.50
WESTERN:								
Colton, Calif.	.....	.....	.....	.....	9.50[4]	.....	.....	.....
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	12.50	20.00
Los Angeles, Calif.	.....	.....	.....	.....	.....	.....	12.00	.....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[20]	.....	11.00[19]	.....
San Francisco, Calif.†	20.00	16.00	12.00	20.00	16.00	.....	16.00	.....

[1]Also 6.00. [2]To 1.35. [3]In 100-lb. bags. [4]To 11.85 per ton, granular but not ground, ¾-in. screen down to 14 mesh. [9]In 80-lb. paper. [10]Per bbl. [17]Less credit for return of empties. [19]To 14.50. [20]Also 13.00. [24]Superfine, 92.25% thru 200 mesh. *Price to dealers. †Wood-burnt lime.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 100% thru 200 mesh, 94% thru 300 mesh, 7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton.
Granville, N. Y.—Red, green and black, $7.50 per ton.
Pen Argyl, Penn.—Blue-black, 6.50 per ton in bulk, plus 10c per bag.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—						
Buckingham oxford grey	13.88	17.22	24.99	29.44	34.44	45.55
Bangor, Penn.—No. 1 clear	10.50–14.50	24.50	29.00	33.50	44.50	55.60
No. 1 ribbon	9.00–10.25	20.00	24.50	29.00	40.00	51.25
Gen. Bangor No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....
Gen. Bangor mediums	9.50–11.25	.....	.....	.....	.....	.....
Chapman Quarries, Penn.	7.75–11.25	13.00–15.00	19.00–22.00	23.00–28.00	27.00–30.00	32.00–35.00
Granville, N. Y.—						
Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green & gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple & unfading gr'n	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Monson, Maine	19.80	24.00	.....	.....	.....	.....
Pen Argyl, Penn.*						
Graduated slate (blue)	.....	16.00	23.00	27.00	37.00	46.00
Graduated slate (grey)	.....	18.00	25.00	29.00	39.00	48.00
Color-tone	11.50–12.50; Vari-tone, 12.00–13.00; Cathedral gray, 14.00–15.00					
No. 1 clear (smooth text)	7.25–10.50; No. 1 clear (rough text), 8.25–9.50					
Albion-Bangor medium	8.00–9.00; No. 2 clear, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1 clear	9.50	18.00	22.00	26.00	36.00	46.00
Blue Mountain No. 2 clear	8.00	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.
*Unfading grey, 14.00–15.00; 10% disc. to roofer; 10%–8⅓% to wholesaler.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc, per ton 5.00
- Ground talc (20-50 mesh), bags 6.50
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel crayons, gross 1.50– 2.00

Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¾% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh 7.50– 8.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of bags. Terms 1%, 10 days.

Clifton, Va.:
- Crude talc, per ton 4.00
- Ground talc (150-200 mesh), in bags 12.00

Conowingo, Md.:
- Crude talc, bulk 4.00
- Ground talc (150-200 mesh), in bags 14.00
- Cubes, blanks, per lb. ..... .10

Emeryville, N. Y.:
- Ground Talc (200 mesh), bags 13.75
- Ground talc (325 mesh), bags 14.75

Hailesboro, N. Y.:
- Ground talc (300-350 mesh) in 200-lb. bags 15.50–20.00

Henry, Va.:
- Crude (mine run) 3.50– 4.50
- Ground talc (150-200 mesh), bags 6.25– 9.50

Joliet, Ill.:
- Ground talc (200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00

Los Angeles, Calif.:
- Ground talc (150-200 mesh), in bags 15.00–60.00
- Crude talc, f.o.b. mine 8.00–12.00

Natural Bridge, N. Y.:
- Ground talc (325 mesh), bags 10.00–15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-72% 3.75– 4.25
Mt. Pleasant, Tenn.—B.P.L. 76-78% 6.75

Ground Rock

(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 65–70% 3.75– 4.30
Mt. Pleasant, Tenn. — Lime phosphate:
B.P.L. 73% 11.20–13.00
Mt. Pleasant, Tenn.—B.P.L., 72% 5.00– 5.50

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

Mulberry, Fla.—Gross ton, f.o.b. mines
- 68/66% B.P.L. 3.15
- 70% minimum B.P.L. 3.75
- 72% minimum B.P.L. 4.25
- 75/74% B.P.L. 5.25
- 77/76% B.P.L. 6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton 100.00–125.00
- Punch mica, per lb. ..... .06
- Scrap, per ton, carloads 20.00

Rumney Depot, Bristol and Cardigan, N. H.—Per ton:
- Punch mica, per ton 150.00–240.00
- Mine scrap 22.50
- Mine run 325.00
- Clean shop scrap 25.00
- Roofing mica 37.50
- Trimmed mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 40.00; 100 mesh, 45.00; 200 mesh 60.00

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Blue Rapids, Kan.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Centerville, Iowa	.....	.....	6.00	7.00	.....	7.50	8.50	10.50a	.....	.....	.....	.....	.....
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton, floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.													
Fort Dodge, Iowa	2.50	6.00	6.00	7.00	9.00	9.00	11.50	8.00	16.00	20.00	15.00	.....	25.00
Grand Rapids, Mich.	.....	.....	.....	.....	9.00d	9.00d	.....	8.00d	.....	21.00d	.....	15.00	25.00
Los Angeles, Calif. (b)	.....	7.00–9.00	7.00–9.00	7.50–9.00	8.00–10.00	.....	8.00–10.00	.....	30.00c	.....	.....	.....	.....
Medicine Lodge, Kan.	1.45	.....	.....	.....	11.50d	.....	11.50d	.....	16.00d	11.50d	.....	.....	.....
Portland, Colo.	.....	7.00	7.00	9.00	9.00	9.50	9.00	.....	27.50	.....	22.50	27.50	.....
Providence, R. I. (x)	.....	.....	.....	12.00–13.00e	.....	.....	.....	.....	.....	.....	.....	.....	.....
Seattle, Wash. (z)	6.00	9.00	9.00	13.00	.....	.....	14.00	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00g	33.00f

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) White molding. (b) Plasterboard, ¼x32x36-in., 14c-17c per sq. ft.; ⅜x32x36-in., 15c-18c per sq. ft. (c) To 40.00. (d) Includes paper bags. (e) Includes jute sacks. (f) "Gyproc," ⅜x48-in. by 5 and 10 ft. long. (g) ⅜x48-by 3 to 4 ft. long. (x) "Fabricaste" gypsum blocks, 2- and 3-in., f.o.b. motor trucks at plant, 7¼c-8¼c. Block setting plaster, per ton, in jute sacks, 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00. (z) Gypsum partition tile, 3-in., 9c per sq. ft., 4-in., 11c per sq. ft.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, 12.00 per ton in bags, bulk, per ton	.....	7.50
Crown Point, N. Y.—Mica Spar	.....	¶9.00–‖12.00
Davenport, Iowa — White limestone, in bags, per ton	‖6.00	‖6.00
Harrisonburg, Va.	12.50–14.50	.....
Middlebrook, Mo.—Red	.....	20.00–25.00
Middlebury, Vt.—Middlebury white	.....	¶9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	.....	c5.50
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Stockton, Calif. — Colored rock aggregate	.....	6.00–18.00
Tuckahoe, N. Y.—Tuckahoe white	6.00	.....
Warren, N. H. (d)	.....	¶8.00–‖8.50
Whitestone, Ga.	.....	10.00

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L. (d) L.C.L., 9.50–15.00 per ton in 100-lb. bags.

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh, per ton	18.00

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140 mesh (bulk)	19.00
Keystone, S. D.—Color, white; analysis, K_2O, 13.25%; Na_2O, 1.92%; SiO_2, 63.50%; Fe_2O_3, .06%; Al_2O_3, 20.10%, pulverized 99% thru 200 mesh, in bags, 17.50; bulk	16.50
Crude, in bags, 9.50; bulk	8.50
Coatesville, Penn.—Color, white; analysis, K_2O, 12.30%; Na_2O, 2.86%; SiO_2, 66.05%; Fe_2O_3, .08%; Al_2O_3, 18.89%; crude, per ton	8.00
Erwin, Tenn.—White; analysis, K_2O, 10%; Na_2O, 2.75%; SiO_2, 68.25%; Fe_2O_3, .10%; Al_2O_3, 18.25%, pulverized 98% thru 200 mesh, in bags, 17.20; bulk	16.00
Crude, in bags, 8.50; bulk	7.50
Rumney and Cardigan, N. H. — Color, white; analysis, K_2O, 9-12%! Na_2O, trace; SiO_2, 64-67%; Al_2O_3, 17-18%, crude, bulk	7.00– 7.50
Rumney Depot, N. H.—Color, white; analysis, K_2O, 8-13%; Na_2O, 1-1½%; SiO_2, 62-68%; Al_2O_2, 17-18%, crude, bulk	7.00– 7.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; pulverized, bulk	18.00

(Bags, 15c extra.)

Cement Drain Tile

Graettinger, Iowa. — Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in. 1.35; 36-in.	2.00
Grand Rapids, Mich.—Drain tile, per 1000 ft.	
4-in.	36.00
5-in.	48.00
6-in.	66.00
8-in.	100.00
10-in.	150.00
12-in.	210.00
Longview, Wash.—Drain tile, per 100 ft.	
3-in.	5.00
4-in.	6.00
6-in.	10.00
8-in.	15.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	12.00

Chicken Grits

Centerville, Iowa	9.25
Belfast, Me.—(Agstone), per ton, in carloads	10.00
Chico. Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per ton	10.00
Coatesville, Penn.—(Feldspar), per ton, in bags of 100 lb. each	8.00
Cranberry Creek, N. Y.—Per ton, in carload lots, in bags, 9.00; bulk, 7.50. Less than carload lots, in bags	12.00
Davenport, Iowa — High calcium carbonate limestone, in bags L.C.L., per ton	6.00
El Paso, Texas—(Limestone) per 100-lb. sack	.75
Los Angeles, Calif.—Per ton, including sacks:	
Gypsum	7.50 –9.50
Middlebury, Vt.—Per ton (a)	10.00
Randville, Mich.—(Marble), bulk	6.00
Seattle, Wash.—(Gypsum), bulk, ton	10.00
Warren, N. H.	8.50– 9.50
Waukesha, Wis.—(Limestone), per ton	7.00
West Stockbridge, Mass.	¶7.50–‖9.00
Wisconsin Points—(Limestone), per ton	15.00

(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton Wis.	10.50
Dayton, Ohio	12.50–13.50
Detroit, Mich. (d)	13.00–16.00*b
Farmington, Conn.	16.00
Grand Rapids, Mich.*	14.00–15.00
Jackson, Mich.	13.00
Madison, Wis.	12.50a
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	9.00*
Mishawaka, Ind.	11.00
New Brighton, Minn.	8.00
Pontiac, Mich. (e)	15.50
Portage, Wis.	15.00
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.50
Sebewaing, Mich.	12.50
South St. Paul, Minn.	9.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada	13.00b
Winnipeg, Canada	15.00

Delivered on job. (a) Less 50c disc. per M 10th of month. (b) 5% disc., 10 days. (c) Delivered in city. (d) Also 14.00 and 15.50. (e) Truck delivery. (g) F.o.b. yard.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Appleton, Minn.	18.00–20.00
Chicago, Ill., district:	
8x8x16. Per 1000	180.00
Chicago, Ill.:	
8x 8x16. Each	.21†
8x 8x16. Each	.18b
8x10x16. Each	.26†
8x10x16. Each	.23b
8x12x16. Each	.30†
8x12x16. Each	.27b
Columbus, Ohio	14.00b–16.00†
Forest Park, Ill.	21.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12a
Lexington, Ky.:	
8x8x16	a18.00*
8x8x16	c13.00*
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*

*Price per 100 at plant.
†Rock or panel face.
(a) Face. (b) Plain. (c) Common.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Cicero, Ill.—12x8 exposure, 15x9-in. size, per sq.	9.50–12.00
Detroit, Mich.—5x8x12, per M	67.50
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Lexington, Ky.—8x15, per sq.:	
Red	15.00
Green	18.00

Cement Building Tile

Chicago District (Haydite):	
8x 4x16, per 1000	140.00
8x 8x16, per 1000	200.00
8x12x16, per 1000	300.00
Columbus, Ohio:	
5x8x12, per 100	6.00
Lexington, Ky.:	
5x8x12, per 100	7.50
4x5x12, per 100	4.00
Longview, Wash. (Stone Tile):	
4x6x12, per 1000	57.50
4x8x12, per 1000	65.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Camden & Trenton, N. J.	17.00	.....
Chicago District "Haydite"	14.00	.....
Columbus, Ohio	16.00	17.00
Ensley, Ala. ("Slagtex")	13.00a	.....
Forest Park, Ill.	.....	37.00
Longview, Wash.	16.50	25.00
Milwaukee, Wis.	14.00	32.00
Omaha, Neb.	17.00	30.00– 40.00
Philadelphia, Penn.	15.50	.....
Portland, Ore.	12.00	22.50– 55.00
Prairie du Chien, Wis.	14.00	22.50
Rapid City, S. D.	18.00	25.00– 40.00

(a) Delivered on job; 10.00 f.o.b. plant.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Note—Bags extra and returnable for full credit.

Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.	.....	53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.	.....	55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	35.00	50.00	65.00
Patchogue, N. Y.	.....	60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

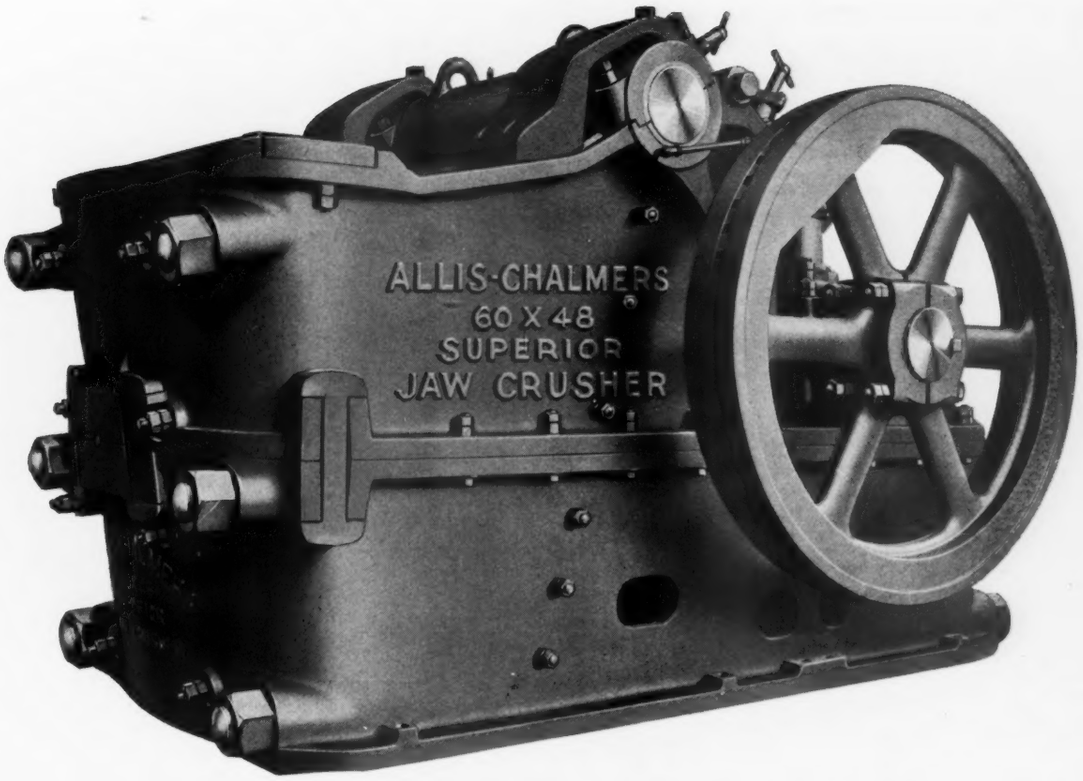
Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% disc.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8-in.	10 in.	12 in.	15-in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Grand Rapids, Mich. (b)	.....	.13½	.21	.31½	.40½	.64	1.00	.....	.....	1.80	.....	.....	.....	.....	.....	.....	.....
Culvert	.....	.....	.....	.60	.70	1.00	1.20	.....	.....	1.80	2.10	2.25	3.35	4.00	5.60	6.90	7.85
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Newark, N. J. (d)	.....	.....	.....	.....	.85	.95	1.25	1.40	1.56	2.09	2.30	3.15	4.05	5.15	6.35	7.65	.....
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.60	.....	2.00	.....	2.75	3.40	.....	6.50	.....	10.00
Tacoma, Wash.	.15	.17	.22½	.30	.40	.55	.70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (c)	.....	.....	.....	.....	.85½	.....	1.14	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31

(a) 24-in. lengths. (b) Sewer, 21-in., 1.40. †21-in. diameter. (c) Reinforced, 15.40 per ton, f.o.b. plant. (d) Reinforced.



Superior Jaw Crushers

SUPERIOR JAW CRUSHERS are the result of over 50 years of crusher designing experience, combined with the most modern manufacturing facilities. The frame is semi-steel reinforced with large forged steel tension rods shrunk in place; for sizes larger than 60x48 in. the frames are cast steel and tension rods are optional, depending on the service. The success of this tension rod construction is evidenced by the fact that no Superior Jaw Crusher Frame of this construction with the rods shrunk in place has failed. Pitmans and swing jaws are cast steel in all sizes. Jaw plates are reversible. Lubrication has received the most careful consideration. This rugged construction has resulted in low operating costs even under the most severe operating conditions. Superior Jaw Crushers are built in various sizes, 15x10 in. to 84x66 in.

Allis-Chalmers Products include complete equipment for crushing, screening and cement plants:—jaw, gyratory and roll crushers, rotating and vibrating screens, multi-roll sizers, washing equipment, and motors, pumps and drives. Write for a bulletin on Allis-Chalmers crushing plant equipment.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

When writing advertisers, please mention ROCK PRODUCTS

News of All the Industry

Incorporations

William J. McCormack Sand Co., Lefcourt-Colonial Bldg., 295 Madison Ave., New York City.

Belmont Quarries, Inc., Wilmington, Del., 2000 shares common.

Washtenaw Rock Products Co., Manchester, Mich., $40,000. To operate mines and quarries.

Standard Gravel Co., Antoine, Pike county, Ark., has increased its capital stock from $50,000 to $100,000.

Northern Materials Corp., Detroit, Mich., 1000 shares no par value. To produce building materials.

Cashion Slag Co., Butler, Penn.; to produce, sell and trade in slag, stone, sand and other building materials. Joseph E. Cashion and R. B. Fleming.

The Charles Dovi Co., Camden, N. J., $100,000. To deal in limestone, shale, etc. Charles E. Kulp, Camden.

Warnasco Products Corp., Wilmington, Del., 200 shares common. To produce concrete, asbestos, etc.

Service Sand and Gravel Co., Cleveland, Ohio, 250 shares, no par value. P. L. Thornbury, Swetland Bldg., Cleveland, James Easly and Leo W. Schultz.

Crab Creek Sand and Supply Co., Youngstown, Ohio, $15,000. W. L. Countryman, Youngstown, Ohio, Andrew Colucci, Marie Colucci and Ray L. Smith.

Quarries

Colorado Fuel and Iron Co. is operating its limestone quarry at Monarch, Colo., and shipping 1000 tons daily to steel mills at Pueblo, Colo.

Sturgeon Bay Co., Sturgeon Bay, Wis., has made many improvements at its plant this winter to increase its output of crushed stone. Shipping of stone for the spring season has already begun, with the arrival of the first of the company's large fleet of boats for transporting material.

Wisconsin Lannon Stone Co., Lannon, Wis., has been awarded contract to furnish stone for a $1,250,000 building to be erected by the Toledo University at Toledo, Ohio. The quarries, which have been idle several months, will resume operations immediately.

Amiesite Products Co., Columbus, Ohio, will construct a plant at the quarries of the Ohio Blue Limestone Co. near Marion, Ohio, for the manufacture of composition road building material. It is expected that the plant will be ready for operation about May 1. C. H. Langdon of Columbus is executive head of the company.

Sand and Gravel

Edgerton Sand and Gravel Co., Edgerton, Wis., incorporation notice of which appeared in a recent issue, has purchased about 21 acres of land in Edgerton from the Edgerton Stock Yards Co. The land purchased includes the gravel pit.

Clarence Sand and Gravel Co.'s new sand pit on the Harrington farm, Alexander, N. Y., has begun operations. Much of the sand is being sent by truck to Attica for use in construction work at the new prison there.

River Sand Co., Steubenville, Ohio, has purchased a new 15-ton derrick which has been installed on the company's derrick boat, replacing the old one. The new equipment will enable the company to materially increase its output of sand and gravel.

Oil City Sand and Gravel Co., Oil City, Penn., has been awarded contract for furnishing approximately 35,000 tons of sand and gravel for a large road project in the state of Pennsylvania. An extensive improvement program was recently inaugurated by the company which when completely will cost approximately $30,000 and increase the capacity of the plant materially.

Cement

Alpha Portland Cement Co.'s plant at Cementon, N. Y., and the **North American Cement Corp.'s** plant at Catskill, N. Y., have started operations after being closed down since early last fall.

Keystone Portland Cement Co., Bath, Penn., has ordered dust collecting equipment from the Northern Blower Co., Cleveland, Ohio, for its new pack house and silos.

Utah-Idaho Cement Co.'s plant north of Brigham City, Utah, has resumed operations. The plant, when operated at full capacity produces 1200 bbl. of cement per day.

Canada Cement Co., Montreal, Can., has awarded contract to the Macdonald Engineering Co., Ltd., Toronto, for the construction of two cement storage bins, 60 ft. high, at Windsor, Ont.

Pennsylvania-Dixie Cement Corp., New York City, is installing Norblo dust collecting equipment in its new pack house, silos and bag cleaning departments at the Des Moines, Iowa, plant.

Three Forks Portland Cement Co., Trident, Mont., will resume full capacity operations on May 1. For ten months the company has employed but 25 men to ship cement from stock and to overhaul the mill. This force will be increased to 125.

Idaho Portland Cement Co. is planning to expend $60,000 in improvements to its plant at Inkom, Idaho, this summer. The improvements will include the installation of steel material bins and storage equipment. Proposal to build a cement products plant for the manufacture of cement tiles, culverts and blocks is being considered by the company.

Lime

Black Marble and Lime Co.'s office has been moved from La Grande, Ore., to Enterprise, Ore., where the plant of the company is located.

Agricultural Limestone

Fertile Milling Co., Fertile, Iowa, has added a stone crusher to its plant equipment and is crushing limestone to supply Worth county farmers. Limestone of this vicinity has been tested and approved for use in soil fertilization by the Iowa state college agricultural station at Ames.

Cement Products

Indianapolis Concrete Products Co., Indianapolis, Ind., has filed papers evidencing dissolution.

Duntile Products Co., Elkhart, Ind., will build a factory and boiler house at an estimated cost of $41,400.

Paramus Block and Sand Co., Maywood, N. J., is in the hands of a receiver. According to reports, Counsellor Emanuel Weitz was appointed permanent receiver to wind up the affairs of the company.

Oklahoma Cement Pipe Co., Tulsa, Okla., has started excavations for its new $50,000 plant. J. M. Chandler, Mayo Bldg., Tulsa, is president of the company.

Gulf Concrete Pipe Co., Brownsville, Tex., is planning the installation of additional equipment in its present plant, and the early establishment of two branch plants in other cities, costing over $75,000 with equipment.

Ready-Mixed Concrete Co., 27 Barbeau St., Pittsburgh, Penn., is closing negotiations with the city of Pittsburgh for lease of part of the municipal property known as Exposition Music Hall site, to be used for expanding its mixing and distributing service.

Chenango Sand and Gravel Co., Sherburne, N. Y., is making a new concrete fence post, cast to enclose on two sides in the upper portion a piece of chestnut wood. Posts of this design are calculated to overcome the objection to those of solid concrete to which it is not possible to fasten things.

Miscellaneous Rock Products

Natrock Products Corp., Stockton, Calif., advises that it has discontinued the production of roofing grits, dashes and poultry grit, and is now producing colored rock aggregate for the artificial stone industry.

Personals

George B. Harris has been elected a director of the American Brick Co., Boston, Mass.

Dr. **Herbert F. Kriege**, in charge of tests at the France Stone Co. Laboratories, Toledo, Ohio, addressed the Exchange Club of Auburndale, Ohio, at its recent meeting.

H. W. Hardinge of the Hardinge Co., York, Penn., returned on April 15 on the Olympic from a six months' trip around the world, after having spent a short period in England and France on business.

John E. Donelson has been named manager of slag sales for the Sloss-Sheffield Steel and Iron Co., Birmingham, Ala., succeeding L. L. Iddings. Mr. Donelson was previously in charge of the ready-mixed department of the Sloss-Sheffield company.

Stanton Walker, director of engineering and research of the National Sand and Gravel Association at Washington, was the dinner guest of the Detroit Engineering Society recently. During his visit to Detroit he gave an address on "Quality Concrete" at the Detroit Edison auditorium.

William E. Magner, president of Cutler-Magner Co., Duluth, Minn., lime manufacturers, was also elected president of the Duluth Builders' Supply Co. of that city. Ralph B. Magner, vice-president of Duluth Builders' Supply Co., has also been elected president of the Cement, Sand and Gravel Co. of Duluth.

P. J. Hamilton has been appointed regional sales manager in charge of sales in Ohio, Pennsylvania and western New York of the Productive Equipment Corp., Chicago, Ill. Before becoming associated with the Productive Equipment Corp. Mr. Hamilton had been with the Chicago Pneumatic Tool Co. for 15 years, serving as manager of the latter company's Cleveland plant for a number of years.

W. S. Rugg, vice-president in charge of engineering of the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., has been placed in charge of sales activities of that company, in addition to engineering activities. With this appointment Mr. Rugg takes over the activities of Edward D. Kilburn, vice-president and general sales manager, who resigned recently. **S. M. Kintner**, director of the Westinghouse research laboratory, has been made assistant vice-president and assumes engineering department duties under Mr. Rugg's direction.

Obituaries

E. T. McCleary, president of the newly formed Republic Steel Corp., died recently after undergoing a serious operation.

Brooks B. Bonstein, 39, electrical superintendent of the Pennsylvania-Dixie Cement Corp.'s plant at Portland Point, N. Y., died April 2 at Ithaca, N. Y.

H. Colin Campbell, former advertising manager of the Portland Cement Association, was executed, April 17, at the New Jersey state prison for the murder of a bigamist wife, committed more than a year ago. He is reported to have spent his last few months writing his memoirs.

James Crosby Brown, Philadelphia banker and a director in numerous eastern corporations, including the Whitehall Cement Manufacturing Co., Philadelphia, and treasurer and director of the Pennsylvania Glass Sand Corp., Lewistown, Penn., died suddenly on April 1 while on his way to keep a business appointment. He was 57 years old.

Manufacturers

Young Radiator Co., Racine, Wis., has purchased additional equipment for its stamping department to increase scope of work heretofore possible.

Eisemann Magneto Corp. announces the removal of its executive and sales offices from 165 Broadway, New York City, to 60 East 42nd St., New York City.

The Reading Chain and Block Corp., Reading, Penn., has appointed R. G. Elliott, 631 Chapel St., New Haven, Conn., to handle its entire line in the state of Connecticut.

American Steel and Wire Co., Chicago, Ill., subsidiary of the United States Steel Co., will spend $2,000,000 for improvements to the Cuyahoga works of the steel and wire division at Cleveland, Ohio.

The Bailey Meter Co., Cleveland, Ohio, has transferred its office in Chicago, Ill., to 20 North Wacker Drive Bldg. R. V. Knapp continues as branch manager in this territory.

Morris Machine Works, Baldwinsville, N. Y., announces the removal of its New York office to the Pennsylvania Bldg. at 225 West 34th St.,

New York City. The office will be in its new location on May 1.

Hill Clutch Machine and Foundry Co., Cleveland, Ohio, has reopened its New York office. A. L. Whiteside, who has been connected with the main plant at Cleveland for several years, is the engineer in charge of the New York office.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., has received orders to furnish all switchgear and control equipment for the world's largest single pumping station being built by the city of Detroit.

Goodyear Tire and Rubber Co., Akron, Ohio, has formed a new subsidiary, the Goodyear Tire and Rubber Co. of Argentina, which has just been incorporated in Ohio. The purpose of the new subsidiary, incorporated for $600,000, is to acquire a factory site in Argentina.

Reeves Pulley Co., Columbus, Ind., has opened its Cleveland, Ohio, branch office at 219 Euclid-Windsor Bldg., 5005 Euclid Ave., Cleveland, Ohio. The office will be in charge of D. C. Batterson, formerly district manager of the Minneapolis office of the Chain Belt Co., and J. H. Gepfert.

National Air Filter Co., Reed Air Filter Co. and **Midwest Manufacturing Co.** have been consolidated and hereafter will function as one organization under the name of the American Air Filter Co., Inc. The latter was formerly holding company for the three concerns.

The General Refractories Co., Philadelphia, Penn., has adopted a co-operative group insurance plan for the benefit of all its employes through contract with the Metropolitan Life Insurance Co. It is estimated that the total life insurance coverage approximates $4,000,000. In the case of non-salaried employes the plan provides for health and non-occupational benefits in addition to life insurance.

Prest-O-Lite Co., Inc., New York City, is to construct a one-story plant and storage building at Cassiano St., San Antonio, Tex. The company also plans a 50x100-ft. factory at Fisk and Dalton Sts., Spokane, Wash., an acetylene producing plant at Casper, Wyo., and a $200,000 factory at Toledo, Ohio.

Trackson Co., Milwaukee, Wis., has appointed Edward R. Bacon Co., San Francisco, Calif., as distributor to handle Trackson Tractor equipment for McCormick-Deering tractors in the San Francisco territory. The Olympic Machinery Co., Seattle, Wash., has been appointed to handle the Trackson line in the state of Washington.

Lincoln Electric Co., Cleveland, Ohio, announces the transfer of three men from the manufacturing division to the welder service division as follows: John C. Ardagh to the Chicago district, with headquarters in the Monadnock Bldg., Chicago, Ill.; R. A. Kyle to the New York district, with headquarters at 136 Liberty St., New York City, and Robert Newton to the Cleveland district, with headquarters at the factory in Cleveland, Ohio.

General Electric Co., Schenectady, N. Y., has been awarded contract to construct one of the largest water-driven machines in this country, both as to capacity and size, for installation in the new generating station of the New York Power and Light Corp. at Spier Falls, on the Hudson river. Gerard Swope, president of General Electric, announces that the company is planning to build a major plant at St. Louis, Mo.

General Refractories Co., Philadelphia, Penn., has appointed Harry N. Crowder Jr. Co. of Easton, Penn., as its exclusive High Temperature Cement dealer in Lehigh and Northampton counties in the state of Pennsylvania, and also including those portions of Warren and Hunterdon in New Jersey adjacent to the Delaware river between the towns of Belvidere and Milford. This dealer will handle Grefco High Temperature Cement and Standard Silica Bonding Cement.

Sullivan Machinery Co., Chicago, Ill., announces that it has secured the sales rights for "Tanner-tanks" and "Tannergas" for the prevention of freezing in compressed air lines and at the exhaust of compressed air tools. The device consists of a tank and by-pass piping connected into the air line near the point of use. This tank contains a liquid which forms a gas on combination with the compressed air in the top of the tank. This gas is carried into the air lines and is the active agent which prevents freezing at the tools.

Chain Belt Co., Milwaukee, Wis., has moved its New York office from 50 Church St. to the new Chrysler Bldg., 405 Lexington Ave., New York City. The new office affords a third more space than the old office. W. H. Quinn is New York district manager. The company recently appointed two new distributors in the construction equipment division. R. B. Everett Co. of Houston, Tex., will distribute its complete line of construction equipment and the J. D. Adams Manufacturing Co. of Indianapolis, Ind., will act as exclusive distributors in the Indianapolis territory for its New Champion Rex Paver and the Rex Road Pump.

Republic Iron and Steel Co., Central Alloy Steel Corp., Donner Steel Co., Inc., and the **Bourne-Fuller Co.** have been merged following the approval of the consolidation by stockholders of the constituent companies. A new company has been formed, known as the Republic Steel Corp. Officers of the new organization are as follows: Chairman, Tom M. Girdler; first vice-president, Benjamin F. Fairless; vice-president in charge of sales, Harry T. Gilbert; vice-president in charge of operations, R. J. Wysor; vice-president, Rollin S. Hall; vice-president, William P. Witherow; secretary, Richard Jones, Jr., and treasurer, John U. Anderson.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Lamp Guard. Folder describing "Lamplok" device for preventing theft of bulbs. MULTIPLE SELLING CORP., New York City.

Crossings. Folder outlining advantages of Amsco process manganese steel crossings. AMERICAN MANGANESE STEEL CO., Chicago Heights, Ill.

Trap Rock. The wear-resistance qualities of trap rock for road building are set forth in a new circular of the JOHN T. DYER QUARRY CO., Norristown, Penn.

Crawler Equipment. A new circular covering AMSCO manganese steel crawler links and sprockets made for Holt and Best tractors has just been issued by the AMERICAN MANGANESE STEEL CO., Chicago Heights, Ill.

Cement Plant Equipment. Circular describing Traylor equipment for cement plants, including compartment mills with automatic feeding device, rotary kilns, coolers and dryers. The leaflet also describes Traylor Bulldog jaw crushers and gyratory crushers. TRAYLOR ENGINEERING AND MANUFACTURING CO., Allentown, Penn.

Material Handling Equipment. A 72-page book describing and illustrating lift trucks and skid platforms, stackers and storage racks of various types, with useful accessories. Photographs, diagrams, specifications and other helpful information is given on each product. LEWIS-SHEPARD CO., Boston, Mass.

Belt Conveyor Equipment. New catalog and engineering data book containing complete and specialized information on the designs and application of Rex-Stearns Timken idlers for all types of belt

Catalog on belt conveyors

conveyors, together wtih data on allied and auxiliary equipment necessary for complete belt conveyor installations. The book also covers briefly silo storage systems. THE STEARNS CONVEYOR CO., Cleveland, Ohio (division of Chain Belt Co., Milwaukee).

Vibrating Screens. Bulletin **KVS** on vibrating screen of the eccentric type, the vibrating action being imparted to the screen by a high-speed eccentric shaft, mounted in self-aligning roller bearings. For screening all classes of sand, gravel and crushed stone. THE GOOD ROADS MACHINERY CO., INC., Kennett Square, Penn.

Floor Armoring. Broadside covering Irving floor armoring, a continuous, trussed, steel surface armoring for making floors and loading platforms shockproof and wearproof; adaptable to floors of concrete, asphalt, mastic composition, or any other plastic flooring material. IRVING IRON WORKS CO., Long Island City, N. Y.

Pulverizers and Dryers. Folder describing grinding unit that can be used for pulverizing several different materials; supplied with two or more product bins as the operator requires. Folder also describes special dryer for drying sticky organic and inorganic materials. HARDINGE CO., York, Penn.

Centrifugal Pumps. Pocketsize catalog on pumps, entitled "Pump Guide No. 12," showing what pumps are used for different services and giving engineering data on each pump. One section of the guide, devoted to useful information, gives tables for figuring pumps. CHICAGO PUMP CO., Chicago, Ill.

Filters for Air Cleaning. Bulletin **No. 1-B.** An informative article, entitled "Is Smoke Responsible for Property Damage?" by R. D. MacLaurin, Ph.D., is reprinted in this bulletin, which also demonstrates how property damage by smoke may be prevented by collecting the smoke at the source of its origin. THE DUST RECOVERING AND CONVEYING CO., Cleveland, Ohio.

Nickel Steel. Bulletin **No. 15,** entitled "Nickel-Chromium Steels for High Temperature Service," covering such phases as the testing of steel at high temperatures, characteristics of nickel-chromium steel for castings and for bolts. Bulletin **No. 16** on the approximate relations between Brinell, Rockwell and Shore hardnesses and the tensile strengths of structural alloy steels. INTERNATIONAL NICKEL CO., INC., New York City.

Welded Chains. New book giving in a very concise way facts and figures concerning various types of welded chain. Tables of sizes, weights, loads and directions for taking measurements are given. The book also tells how to order chain in accordance with the A. S. T. M. and A. R. A. specifications, with excerpts from these specifications. It also contains the rules and cautions issued by the Chain Institute. AMERICAN CHAIN CO., INC., Bridgeport, Conn.

Chain Drives. Booklet on chain drives, covering silent chain drives, duplex roller chain drives, single roller chain drives, compound reduction drives, completely illustrated and containing instructions for the care of chain drives, together with charts for aiding those interested to select the proper chain drive. Also another interesting booklet giving a history of the Hans Renold company and its founder, Hans Renold, an authority on chains. HANS RENOLD, INC., New York City.

Scales. "Beginning the Second Century" is the title of an interesting piece of institutional literature produced in celebration of the centennial anniversary of the invention of the platform scale by Thaddeus Fairbanks and the founding of Fairbanks, Morse and Co. The book goes into the history of the development of weighing machines and tells something of the accomplishment and aims of the Fairbanks company. FAIRBANKS, MORSE AND CO., Chicago, Ill.

G-E Bulletins. GEA-1247 on CR1026 enclosed starting rheostats for repulsion-inductions motors. **GEA-1157A** on general-purpose strip heaters for package machines, pipe heaters, process machines, pump and valve houses, etc. **GEA-556C** on automatic arc-welding head and control, of particular value in the construction of products such as pipes, tanks, boilers, etc., and in building up worn car-wheel flanges and shafts. **GEA-1236** on Fabroil gears. **GEA-1242** on Textolite gears for use in any application for which non-metal gears are desired. Can be made in sheet form. **GEA-1117** on solid-shaft, vertical induction motors, 20 to 200 hp., all commercial speeds and frequencies. **GEA-1202** on Type RKS capacitor motors; single-phase, 60-cycle; wound stator and squirrel-cage rotor. "Arc-Welding in Industry," a 40-page book, completely illustrated, containing chapters on replacement of castings, structural steel, tanks and pressure vessels, pipe welding, heating, ventilating and pipe fitting, jigs, fixtures and dies, steel floors and decks, cast-iron welding, atomic-hydrogen arc-welding, etc. GENERAL ELECTRIC CO., Schenectady, N. Y.

Power Salesman Outsells Diesel at Southern Gravel Pit

A. FRANK TRIMBLE, Springfield, Tenn., has recently secured from the Camden Gravel Co., a large power contract for the Tennessee Light and Power Co. He also secured an order for motors and equipment amounting to over $3,000. A total of 115 hp. in motors was sold.

Mr. Trimble secured this contract in competition with Diesel oil engines, crude oil and steam engines. The Camden Gravel Co. operates a gravel or chert pit at Camden, Tenn. The gravel is used in road building and the company ships on an average over sixty car loads a day.—*Springfield* (Tenn.) *Times.*